CALIFORNIA MARINE LIFE PROTECTION ACT

MASTER PLAN
for
Marine Protected Areas

California Department of Fish & Game

Revised Draft
August 11, 2006

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NOTE - PAGE NUMBERS MAY NOT MATCH UNTRACKED VERSION

List of Figures

Deleted: **83**
Deleted: 83
Deleted: 84
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Deleted: 88
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Deleted: **165**
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Deleted: 103
Deleted: Hopkins
Deleted: 106
Deleted: 110
Deleted: 116
Deleted: 119
Deleted: 123
Deleted: 126
Deleted: 128
Deleted: 131
Deleted: 134
Deleted: Figure 18. Description of Structural Tiers 135¶

List of Tables

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Deleted: 6
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Appendices (a separate document)

A. The Marine Life Protection Act
B. The Marine Managed Areas Improvement Act
C. Implementation of the Marine Life Protection Act: 1999-2004
D. Strategy for Stakeholder and Interested Public Participation
E. Social Science Tools and Methods
F. Outline of Information Required for Proposals for Alternative Networks of Marine Protected Areas
G. Master List of Species Likely to Benefit from Marine Protected Areas
H. Summary of Recent and Ongoing Processes Related to the Marine Life Protection Act Initiative
I. List of Existing State Marine Protected Areas prior to MLPA Implementation (January 2005)
J. Glossary and Defined Terms
K. Marine Life Protection Act Initiative Lessons Learned Report from the Central Coast Regional Process
L. Marine Life Protection Act Initiative Estimated Long-Term Costs to Implement the California Marine Life Protection Act
M. Marine Life Protection Act Initiative Consultant's Adaptive Management and Monitoring and Evaluation Framework
N. Marine Life Protection Act Initiative Task Force Memo and Consultants' Report on Options for Funding the Marine Life Protection Act

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Section 6: Monitoring and Adaptive Management of MPAs

The MLPA requires adaptive management to ensure that a system of MPAs meets its stated goals [Section 2853 (c) (3)]. The MLPA defines adaptive management as "a management policy that seeks to improve management of biological resources, particularly in areas of scientific uncertainty, by viewing program actions as tools for learning. Actions shall be designed so that, even if they fail, they will provide useful information for future actions, and monitoring and evaluation shall be emphasized so that the interaction of different elements within marine systems may be better understood" (Section 2852 (a)). Adaptive management requires learning from current experience to improve the process of achieving the goals of the MLPA over time. The law embeds ecosystem-based adaptive management, monitoring, and evaluation into the state policies related to the management of MPAs.

This approach will require the State to develop and implement a monitoring, evaluation, and adaptive management program. The State must also develop the institutions and processes for adaptive management which do not yet exist. Two such examples are the institutions and processes by which monitoring data are collected, maintained and made useful to policy makers over long periods of time and those required to assess this information, including involvement of scientists and stakeholders and formulate recommendations to policy makers. Adaptive management, monitoring, and evaluation will be implemented at multiple spatial scales, including individual MPA, MPA networks in a region, and statewide when appropriate.

It is worth noting that the MLPA calls for monitoring and evaluation of selected areas within the preferred alternative to assist with adaptive management of the MPA network. This does not mean that other MPAs should not also be monitored and evaluated in accordance with their own objectives and regional goals, but that the performance of selected MPAs might be used to guide future decisions over a wider area.

Monitoring and evaluation should not be done for their own sake, but to gauge the performance of an MPA in relation to its objectives. A cost effective approach in many areas may be to link these activities to other ongoing monitoring activities. Similarly there may be many opportunities to involve affected stakeholders and members of the general public in monitoring and evaluation activities as well, thus leveraging further the resources available.

An important part of marine ecosystem management is the establishment of programs to monitor, evaluate performance, and adaptively manage the biological, social, and economic status and trends of areas within and nearby the MPAs. This chapter develops a general approach to these issues and Chapter 8 includes specifics for individual MPA network components. Long-term monitoring data are critical for understanding the status and trends of resources and identifying emerging threats to MPAs. The data will help managers, policymakers, scientists, and stakeholders determine the impacts and effectiveness of the MPA array. Data will be used to evaluate the progress towards achieving the statewide goals, regional goals and objectives, and objectives for individual MPAs established by the MLPA and by the regional stakeholder groups. They will aid in understanding the structure and function of ecosystems within the MPA system, and thereby provide an improved scientific basis for future decision-making. These data will be used for adaptive management of the MPAs.

Deleted: In the last several decades, monitoring and evaluation have become important features of management approaches to living marine resources and the environment (NRC 1990, NRC 2001). More recently, they have become central elements in management programs intended to adapt as understanding of the managed ecosystems – both the biophysical and social systems – improves and circumstances change. In California, the legislature incorporated this adaptive approach into the Marine Life Management Act (MLMA) in 1998. Besides defining adaptive management, the MLMA requires the development of research and monitoring activities within fishery management plans [FGC Sections 90.1, 7073(b)(3), and 7081]. ¶

Deleted: A year later, the legislature incorporated the principle of adaptive management as well as monitoring and evaluation of MPAs and a statewide MPA network into the MLPA in several passages. At FGC Section 2856(a)2(H), for instance, the MLPA requires that the master plan include "[R]ecommendations for monitoring, research, and evaluation in selected areas of the preferred alternative, including existing and long-established MPAs, to assist in adaptive management of the MPA network, taking into account existing and planned research and evaluation efforts."¶
¶
In these and other ways, the MLPA emphasizes the role of monitoring and evaluation in adapting individual MPAs and the MPA network in response to new knowledge and circumstances. The adaptive management approach of the MLPA provides for future proposals to add, modify, or eliminate MPAs based on information gained from monitoring and evaluation activities, the development of new scientific information, and input from interested parties. ¶

Deleted: Since MPAs will be implemented in a phased approach in individual regions through 2011 rather than adopted all at once statewide, the initial focus must be on developing effective monitoring programs in individual regions, including monitoring in areas both inside and outside MPAs. The final phase in developing monitoring and evaluation programs will be to evaluate and adjust these programs in individual regions to reflect a coherent program statewide. ¶

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Since MPAs will be implemented in a phased approach in individual regions through 2011, rather than adopted all at once statewide, the monitoring programs will be developed sequentially as planning is completed for each region. Nevertheless, integrating these regional monitoring programs into a coherent statewide program will be essential to ensure the resulting data can be analyzed, reported, and used to inform statewide policies. Significant economies of scale also will result if standardized methods are applied across multiple locations and regions. Early consideration should be given to how the regional monitoring programs will be integrated into the statewide system, because such integration is likely to require development of general practices – such as protocols, data standards, and information management systems – that can be applied across multiple MPAs and regions.

Clear and measurable objectives should form the basis for the design of systems to monitor and evaluate the impacts of management actions. Monitoring and evaluation systems should explicitly address five principles (Pomeroy et al. 2004). Such programs should be:

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- Useful to managers and stakeholders for improving MPA management;
- Practical in use and cost;
- Balanced to seek and include scientific input and public participation;
- Flexible for use at different sites and in varying conditions; and
- Holistic through a focus on both natural and human perspectives.

Developing a Monitoring and Evaluation Program for MPAs and Network Components

To promote consistency among monitoring and evaluation programs in different regions, a consistent process should be followed. Many of the recommendations below are modified from a 2004 guidebook to natural and social indicators for evaluating MPA management effectiveness (Pomeroy et al. 2004). This discussion relies heavily on the guidebook because it is comprehensive, reflects the experience from MPAs around the world, has been field tested, and relies principally upon techniques that are simple rather than complex, and therefore more likely to be implemented and sustained over the long-term. The overall intent is to ensure that progress is made to achieve the overall Goals of the MLPA. Individual MPA objectives are important in this, but should be linked to the program goals for use in evaluation.

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The process below presents only the more general features of the approach presented by Pomeroy et al.; much more detail is available in the guidebook itself. In addition, monitoring and evaluation programs should reflect local conditions, constraints and opportunities. The basic steps for establishing a monitoring program are listed below and displayed in a flowchart in Figure 5.

- Identify regional goals and objectives and individual MPA objectives
  - Identify any overlapping goals and objectives
- Select indicators to evaluate biophysical and socioeconomic patterns and processes
  - Review and prioritize indicators,
  - Develop quantifiable benchmarks of progress on indicators that will measure progress toward regional goals and objectives and individual MPA objectives, and
  - Identify how selected indicators and benchmarks relate to one another

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- Plan the evaluation
  - Assess existing data;
  - Assess resource needs for measuring selected indicators;
  - Determine the audiences to receive the evaluation results;
  - Review relevant monitoring and evaluation programs at existing MPAs, such as at the Channel Islands;
  - Identify participants in the evaluation; and
  - Develop a timeline and work plan for the evaluation.
- Review and revise planned monitoring and evaluation program
  - Conduct structured peer and public review processes, and
  - Make modifications in response to review
- Implement the evaluation work plan
  - Select methods and approach and collect data;
  - Manage collected data (including identifying the data manager, providing for the long-term archiving and access to the data, and making the data available for analysis and sharing);
  - Analyze collected data; and
  - Conduct peer review and independent evaluation to ensure robustness and credibility of results
- Communicate results and adapt management
  - Share results with target audiences, and
  - Use results to adapt management strategies

Indicators of success include those pertaining to biophysical and socioeconomic goals and objectives. Examples include, among many others, focal species abundance to determine whether resources are being sustained and human use levels to determine if desired enhancement of recreational, research, and other non-consumptive opportunities is occurring. Pomeroy et al. list a total of 42 indicators (10 biophysical, 16 socioeconomic, and 16 governance) that cover combinations of 21 commonly used MPA goals and 68 commonly used objectives. The guidebook essentially provides a "toolbox" of indicators and a starting point for developing a plan. It also provides some detail on survey methods used to measure the indicators, though is not a comprehensive listing of all survey methodologies. Once regional goals and objectives are selected and individual MPA objectives determined, the guidebook and following flowchart (Figure 5) will help provide a method to establish monitoring programs.

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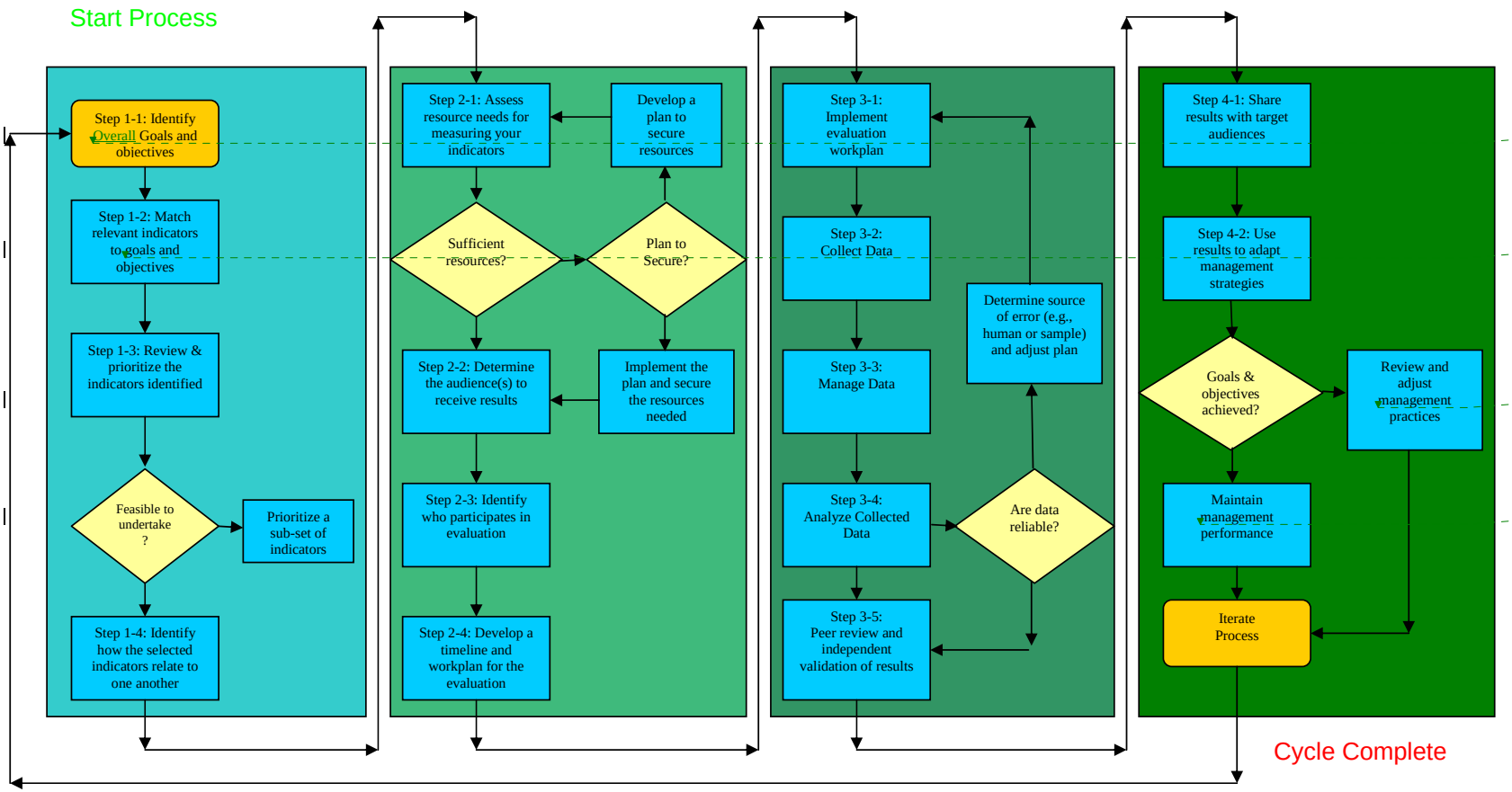
Figure 5. Flowchart of process to establish and conduct a monitoring program[12].



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[12] Adapted from Pomeroy, et al., 2004.

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To achieve the purpose of informing adaptive management, the results of monitoring and evaluation must be communicated to decision makers and the public in terms that they can understand and act upon (NRC 1990). Moreover, in addition to aiding in MPA management, measuring, analyzing and communicating indicators can promote learning, sharing of knowledge and better understanding of MPA natural and social systems among scientists, resource managers, stakeholders, members of the public, and other interested parties (Pomeroy et al. 2004). To these ends, monitoring and evaluation programs for MPAs should include a communications plan that identifies the target audiences and specifies the timing, methods, and resources to regularly synthesize and present monitoring and evaluation results.

Though the results from ongoing monitoring and evaluation should be reviewed periodically, a comprehensive analysis of monitoring results should be conducted approximately every five years. The longer time-frame for review takes into account the fact that biological changes are slow to occur. Some trends are more likely to become apparent on this time scale, although others may take longer to emerge. These reviews should be transparent, include peer review, and make results available to the public. Besides evaluating monitoring methods and results, the review should evaluate whether or not the monitoring results are consistent with the objectives of the individual MPA, the goals and objectives of the region, and those of the MLPA. If the results are not consistent, the review should develop recommendations for adjustments in the management of the MPA network.

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Within the above set of required components, specific monitoring methods are not prescribed, although, as mentioned previously, some alignment of regional and statewide approaches will be desired. For example, monitoring and evaluation programs may be effective within a range of levels in intensity and sampling frequencies. They also may rely on different indicators, depending on the individual and regional MPA goals and objectives.

General Considerations in Identifying Indicators

An indicator measures the success of a management action, such as the specific design of an MPA. It is a unit of information measured over time that will make it possible to document changes in specific attributes of the MPA (Pomeroy et al. 2004). General considerations in selecting or designing an indicator include:

- Measurable - able to be recorded and analyzed in quantitative or qualitative terms.
- Precise - clear meaning, with any differences in meaning well understood OR measured the same way by different people.
- Consistent - not changing over time, but always measuring the same thing.
- Sensitive - changing proportionately in response to actual changes in the variables measured.
- Simple - rather than complex.
- Independence defined - correlation with other indicators examined.

In selecting indicators, a monitoring and evaluation plan for a portion of the MPA network should (Pomeroy et al. 2004):

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- Define and provide a brief description of the indicator;

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- Explain the purpose and rationale for measuring the indicator;
- Consider difficulty and utility—that is, how difficult it is to measure and the relative usefulness of information provided by the indicator;
- Evaluate the required resources including people, equipment, and funding;
- Specify the method and approach to collecting, analyzing, and how the sampling design addresses issues of spatial and temporal variation;
- Identify reference points or benchmarks against which results will be measured and timelines within which changes are expected;
- Explain how results from measuring the indicator can be used to better understand and adaptively manage the program;
- Provide references on methods and previous uses of the indicator.

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Prior knowledge of the variability in the indicators selected should be incorporated into the monitoring and evaluation design where possible. If no prior knowledge exists variation in indicators must be identified within the monitoring and evaluation program. Multiple independent indicators are required for complex systems such as in the marine environment. Consideration also should be given to the timescale within which changes in an indicator might reasonably be expected. For instance, recovery of populations of long-lived species, such as some rockfishes, may require many years; performance measures or other types of benchmarks for such indicators should reflect this longer timescale.

Monitoring and evaluation programs should measure at a minimum biophysical and socioeconomic indicators, since these dimensions of marine ecosystems are inextricably linked (Pomeroy et al. 2004). Possible indicators are described below.

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Biophysical. One common focus of MPA programs is the conservation of living marine resources and habitats of California's coastal waters. Likely biophysical goals established under the MLPA include sustaining the abundance and diversity of marine wildlife, protecting vulnerable species and habitats, and restoring depleted populations and degraded habitats. Thus, potential biophysical indicators might include (Pomeroy et al. 2004):

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- Abundance and population structure of species of high ecological or human use value;
- Composition and structure of a community of organisms;
- Survival of young;
- Measures of ecosystem condition;
- Type and level of return on fishing effort;
- Water quality; and
- Areas whose habitat or wildlife populations are showing signs of recovery.

Socioeconomic. Socioeconomic indicators make it possible to understand and incorporate the concerns and interests of stakeholders, to determine the impacts of management measures on stakeholders, and to document the uses and values of the program for the public and to decision makers (Pomeroy et al. 2004).

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Examples of possible socioeconomic indicators consistent with MLPA goals include:

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- Use data (and values of those uses) for consumptive and non-consumptive purposes, including:
    - Numbers of participants
    - Measures of economic and perceived value and level of satisfaction derived from allowed consumptive and non-consumptive activities
    - Changes in geographic and other patterns of use in and around MPAs within the region;
- Effects of allowed human uses on MPA resources;
- Volunteer and community engagement in MPA-related monitoring and education;
- Shareholder knowledge of natural history and current use patterns and intensity.

All of these indicators would be tailored and specifically defined to reflect the conditions, resources present, use patterns and goals and objectives of each MPA or region.

In addition, it is important to recognize the role that volunteer monitoring activities can play in evaluation. As mentioned earlier, there may be many opportunities to leverage with existing monitoring activities in the region and to make very productive use of stakeholder, other members of the public and educational and research entities to form partnerships in conducting monitoring and management programs. For example, the Citizen Watershed Monitoring Network in the Monterey Bay National Marine Sanctuary has used a monitoring protocol developed by the U.S. Environmental Protection Agency in collecting information on water quality in the sanctuary. Information from this program has helped in determining where education and outreach efforts should be targeted, in determining how successful specific pollution reduction activities have been, and in identifying problem areas for further investigation.

Finally, monitoring and evaluation programs can benefit from engaging commercial and recreational fishermen. At the Channel Islands, in Morro Bay, Fort Bragg, and elsewhere along the California coast, fishermen, research scientists, and federal and state biologists are carrying out field projects of mutual interest, including tag-and-recapture studies that provide critical information on the movement of fish and their growth rates. Similarly, recreational fishermen have recently participated in collecting information on their catches as part of the Coastside Fishing Club's Recreational Catch Estimation Project. The Channel Islands National Marine Sanctuary Foundation supports a Cooperative Marine Research Program which helps coordinate and fund fisheries/science cooperative monitoring projects. These initiatives are in the early stages of development, and offer important opportunities for collaboration.

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Deleted: <#>Level of understanding of human impacts on resources;¶ <#>Perceptions of non-market and non-use value;¶ <#>Community infrastructure and business;¶ <#>Number and nature of markets; and¶

Deleted: Governance. By definition, MPAs are a governance tool since they limit, forbid, or otherwise control human use of marine areas and wildlife through rights and rules (Pomeroy and others 2004). Governance may include enforcement, use rights, and regulations. Goals for governance of MPAs include the following (Pomeroy et al. 2004): ¶ ¶ <#>Legal certainty as indicated by legal challenges or reported failure to act because of legal uncertainty;¶ <#>Effective management structures and strategies maintained;¶ <#>Effective legal structures and strategies for management maintained;¶ <#>Effective public participation and representation ensured;¶ <#>Management plan compliance by resource users enhanced; and¶ <#>Resource use conflicts managed and reduced.¶ ¶ Possible governance indicators include the following:¶ ¶ <#>Local understanding of MPA regulations;¶ <#>Availability of MPA administrative resources;¶ <#>Existence and activity level of community organizations; ¶ <#>Level of public involvement; and¶ <#>Clearly defined enforcement procedures.¶ ¶

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Detailed Objectives (with reference to regional goal and objective):

- Protect area of high species diversity characteristic of the central coast region north of Monterey Bay and maintain species diversity and abundance as demonstrated by monitoring appropriate indicator species, with focus on Nearshore Fishery Management Plan species. (Goal 1, Objective 1)
- Protect communities associated with diverse intertidal habitats including wave-cut rocky platforms, sand and gravel beaches, offshore island, shallow rocky reef, shallow soft bottom, and mixed giant/bull kelp beds, in close proximity to each other. (Goal 1, Objective 2)
- Protect natural size and age structure and genetic diversity of populations of nearshore rockfish species and invertebrates including appropriate indicator species. (Goal 1, Objective 3)
- Protect natural trophic structure and food web including forage base (including crabs, squid and coastal pelagic finfish) for listed marine birds and marine mammals as well as higher trophic level fish. (Goal 1, Objective 4)
- Protect range of ecosystem functions associated with lee of headland in productive upwelling zone. (Goal 1, Objective 5)
- Protect important forage area for nearby breeding colonies of listed marine birds and marine mammals, including sea otters. Reduce disturbance to breeding colonies of listed marine birds, in particular marbled murrelets, and marine mammal rookeries from activities associated with vessels fishing (lights, noise, etc). (Goal 2, Objective 1)
- Protect larval source and enhance reproductive capacity of invertebrate species such as Dungeness crab, limpets, mussels, turban snails, red abalone, black abalone, and finfish species including nearshore rockfishes and California halibut. (Goal 2, Objective 2)
- Site a marine protected area adjacent to a terrestrial state park with high number of annual visitors that has traditionally served as an important marine education site through visitor center and docent program. (Goal 3, Objective 1)
- Include sandy and gravel beaches, and shallow hard and soft bottom habitat in a state marine reserve. (Goal 4, Objective 2)

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Summary of Objectives: Continue to provide complete protection for one of the few estuarine areas of the central coast and expand this protection to include the entire slough channel as opposed to one half of the channel as is presently included.

Detailed Objectives (with reference to regional goal and objective):

- Protect estuarine area with high bird diversity. (Goal 1, Objective 1)
- Protect communities associated with area with diversity of estuarine habitats, including open channels, mud flats, and eelgrass beds, in close proximity to each other. (Goal 1, Objective 2)
- Protect natural age, size structure, and genetic diversity of fish and invertebrate species characteristic of one of largest estuarine systems within the central coast, in particular elasmobranches, flatfishes, gaper clams, and fat innkeeper worms. (Goal 1, Objective 3)
- Protect natural structure and food web of estuarine system, including invertebrate forage base for sea otters and marine birds. (Goal 1, Objective 4)
- Help protect listed marine birds and southern sea otter by protecting feeding, roosting, and nesting habitat. (Goal 2, Objective 1)
- Enhance reproductive capacity of both invertebrate and fish species by prohibiting take in important nursery area. (Goal 2, Objective 2)
- Provide increased research and education opportunities by expanding an existing state marine reserve in an area adjacent to educational and interpretive facilities of the National Estuarine Research Reserve and Moss Landing Marine Laboratories. (Goal 3, Objective 1)
- Include and replicate representative estuarine habitat in central coast region within a state marine reserve. (Goal 3, Objective 2)
- Include estuarine habitat within a state marine reserve. (Goal 4, Objective 1)

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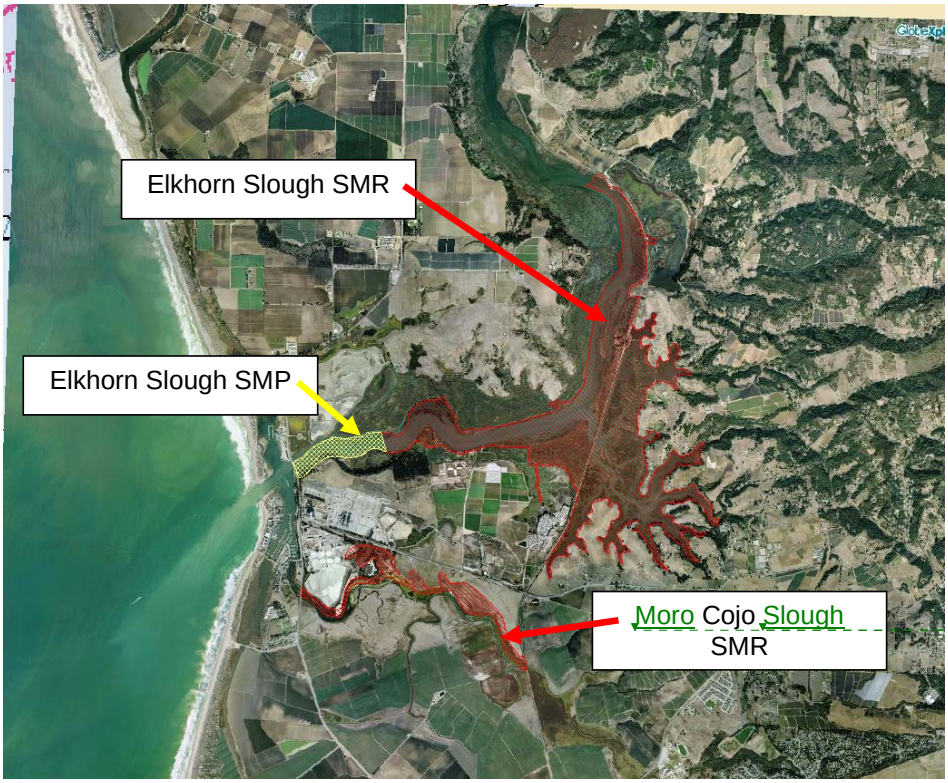
Figure 7. Elkhorn Slough State Marine Reserve, Elkhorn Slough State Marine Park, and Morro Cojo Lagoon State Marine Reserve.



Proposed MPA: Elkhorn Slough State Marine Park
Area (sq. mi.): 0.09
Along-shore span (mi): 1.4
Depth range (ft): 0-10

Primary habitat types: estuary, coastal marsh, tidal flats, shallow soft bottom.

Proposed regulations: Take of all living marine resources is prohibited except the recreational take of finfish by hook-and-line, and the recreational take of clams in the area adjacent to the Department of Fish and Game Wildlife Area on the north shore of the slough.

Boundaries: This area includes the area below mean high tide within Elkhorn Slough between the Highway 1 Bridge and longitude 121º 46.40' W. (Figure 7).

Examples of species likely to benefit: crabs, ghost shrimp, mud shrimp, worms, eelgrass.

Summary of Objectives: Provide increased protection for one of the few estuarine areas of the central coast while allow for traditional uses of recreational fishing. The intent of the area is to allow small scale recreational fishing activities to continue, while limiting any future

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increases in use that do not presently occur. The area will also prohibit take of clams in an area used by sea otters for foraging, potentially providing more available prey for the otters.

Detailed Objectives (with reference to regional goal and objective):

- Protect estuarine area with high bird diversity. (Goal 1, Objective 1)
- Protect communities associated with area with diversity of estuarine habitats, including open channels, mud flats, and eelgrass beds, in close proximity to each other. (Goal 1, Objective 2)
- Protect natural age, size structure, and genetic diversity of some invertebrate species, such as fat innkeeper worms, characteristic of one of largest estuarine systems within the central coast. (Goal 1, Objective 3)
- Provide for traditional recreational consumptive and nonconsumptive uses while offering some protection due to the prohibition of commercial fishing. (Goal 2, Objective 3)

Proposed MPA: Moro Cojo Slough State Marine Reserve
Area (sq. mi.): 0.46
Along-shore span (mi): 5.0
Depth range (ft): 0-10

Primary habitat types: estuary, tidal flats, shallow soft bottom.

Proposed regulations: No take.

Boundaries: This area includes the area within Moro Cojo Slough below mean high tide and between the Highway 1 Bridge and the crossing of the Southern Pacific Railroad tracks (Figure 7).

Examples of species likely to benefit: surfperches, snails, eelgrass.

Summary of Objectives: Provide complete protection for one of the few estuarine areas of the central coast. A recent grant to the North Monterey County Recreation and Park District will create more than three miles of nature trails and interpretive stations within the slough; the additional protection provided by the reserve will help ensure this increased access does not lead to new take of living resources.

Detailed Objectives (with reference to regional goal and objective):

- Help protect listed marine birds by protecting feeding, roosting, and nesting habitat. (Goal 2, Objective 1)
- Include and replicate representative estuarine habitat in central coast region within a state marine reserve. (Goal 3, Objective 2)
- Include estuarine habitat within a state marine reserve. (Goal 4, Objective 1)

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Proposed MPA: Soquel Canyon State Marine Conservation Area
Area (sq. mi.): 23.39
Along-shore span (mi): 7.2
Depth range (ft): 247-2113

Primary habitat types: shallow hard and soft bottom, deep hard and soft bottom, deep canyon.

Proposed regulations: Take of all living marine resources is prohibited except the commercial and recreational take of pelagic finfish and take of spot prawn by trap.

Boundaries: This area is bounded by straight lines connecting the following points in the order listed (Figure 8):
36º 51.00' N. lat. 121º 56.00' W. long.;
36º 51.00' N. lat. 122º 03.80' W. long.;
36º 48.00' N. lat. 122º 02.88' W. long.;
36º 48.00' N. lat. 121º 56.00' W. long.; and
36º 51.00' N. lat. 121º 56.00' W. long.

Examples of species likely to benefit: shelf and slope rockfishes, lingcod, Dover sole, squid.

Summary of Objectives: Provide increased protection to shallow and deep complex submarine canyon habitat and the majority of associated benthic species. This area would allow the continued take of spot prawn by trap and allow comparisons with an area that precludes this take just to the south (Portuguese Ledge). The Soquel Canyon area is important to the formation of an ecologically sound MPA network component, by linking these habitats to similar habitats in other parts of the region.

Detailed Objectives (with reference to regional goal and objective):

- Protect area with high species diversity associated with submarine canyon, including depth-stratified species assemblages with shelf and slope rockfishes. (Goal 1, Objective 1)
- Help protect communities associated with area of diverse habitat including shallow hard and soft bottom, deep hard and soft bottom, and submarine canyon, over a large depth range, and in close proximity to each other. (Goal 1, Objective 2)
- Help restore overfished groundfish species by maintaining large individuals of species such as bocaccio, canary, and yelloweye rockfishes in an area that serves as a natural refuge for these species due to inaccessible vertical rock outcrops in a submarine canyon. (Goal 1, Objective 3)
- Protect overfished rockfishes, including bocaccio, canary, and yelloweye. (Goal 2, Objective 1)
- Enhance reproductive capacity of benthic and deepwater fish species by prohibiting fishing for these species and allowing only fisheries with limited bycatch of these species. (Goal 2, Objective 2)
- Protect rockfishes and other components of a deep benthic community, while allowing the harvest of pelagic finfish and spot prawn. (Goal 2, Objective 3)

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- Enhance education and study opportunities by establishing a marine protected area near the Monterey Bay Aquarium Research Institute and Moss Landing Marine Laboratories where remotely operated vehicles, a future Monterey Accelerated Research System (MARS) cable, and other research methods have already generated baseline data. (Goal 3, Objective 1)
- Provide replicate deepwater hard bottom, soft bottom and submarine canyon habitats, in which fishing for benthic finfish species is prohibited, for Portuguese Ledge and Point Lobos State Marine Conservation Areas and Big Creek State Marine Reserve. (Goal 3, Objective 2)
- Include submarine canyon head habitat within a marine protected area. (Goal 4, Objective 1)
- Include and replicate deepwater hard and soft bottom and submarine canyon habitats across a wide range of depth. (Goal 4, Objective 2)
- Minimize negative socio-economic impacts to the pelagic finfish and spot prawn fisheries while protecting benthic finfishes within a marine protected area. (Goal 5, Objective 1)
- Minimize negative socio-economic impacts to rockfish fisheries by establishing a state marine conservation area in an area which encompasses part of the Rockfish Conservation Area, which is already closed to rockfish fishing. (Goal 5, Objective 1)
- Establish marine protected areas that meet Master Plan Framework scientific guidelines regarding preferred size (greater than 18 square miles). (Goal 5, Objective 3)

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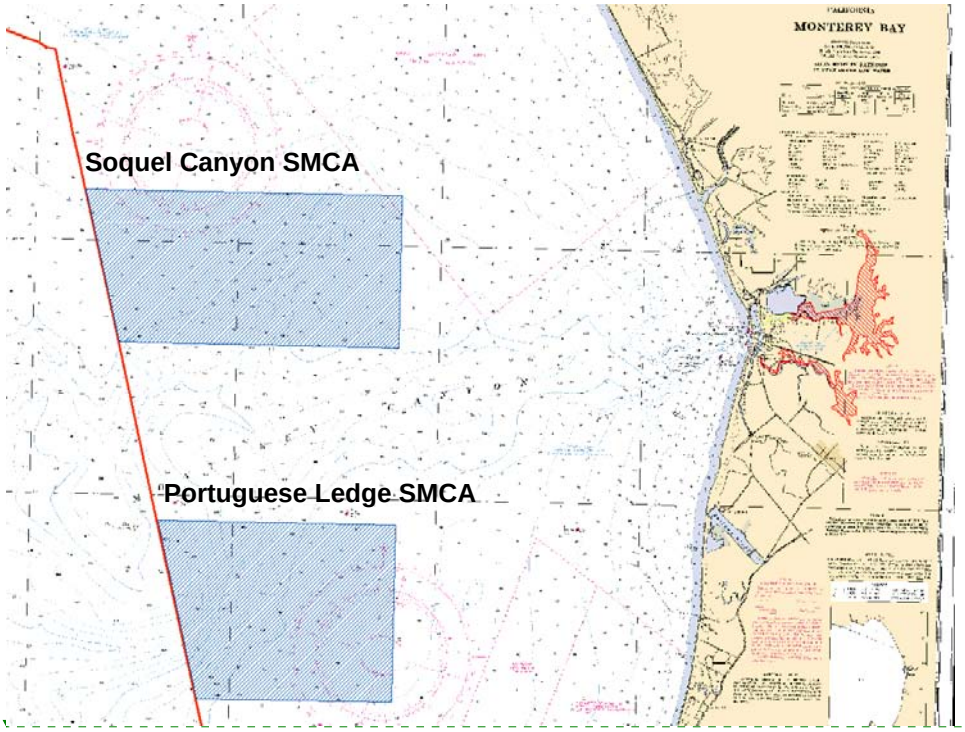
Figure 8. Soquel Canyon State Marine Conservation Area and Portuguese Ledge State Marine Conservation Area.



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Proposed MPA: Portuguese Ledge State Marine Conservation Area
Area (sq. mi.): 19.82
Along-shore span (mi): 5.4
Depth range (ft): 302-4838

Primary habitat types: shallow hard and soft bottom, deep hard and soft bottom, deep submarine canyon.

Proposed regulations: Take of all living marine resources is prohibited except the commercial and recreational take of pelagic finfish.

Boundaries: This area is bounded by straight lines connecting the following points in the order listed (Figure 8):
36º 44.50' N. lat. 121º 56.00' W. long.;
36º 44.50' N. lat. 122º 01.85' W. long.;
36º 41.00' N. lat. 122º 00.80' W. long.;
36º 41.00' N. lat. 121º 56.00' W. long.; and
36º 44.50' N. lat. 121º 56.00' W. long.

Examples of species likely to benefit: shelf and slope rockfishes, lingcod, Dover sole, Dungeness crab, spot prawn, squid.

Summary of Objectives: Provide increased protection to deep submarine canyon, other deep hard and soft habitat, and all associated benthic species. This area would prohibit the take of spot prawn by trap and allow comparisons with an area that allows this take just to the north (Soquel Canyon). This area is important to the formation of an ecologically sound MPA network component, by linking these habitats to similar habitats in other parts of the region.

Detailed Objectives (with reference to regional goal and objective):

- Protect area with high species diversity associated with submarine canyon, including depth-stratified species assemblages with shelf and slope rockfishes. (Goal 1, Objective 1)
- Help protect communities associated with area of diverse habitat including shallow hard and soft bottom, deep hard and soft bottom, and submarine canyon, over a large depth range, and in close proximity to each other. (Goal 1, Objective 2)
- Help restore overfished groundfish species by maintaining large individuals of species such as bocaccio, canary, and yelloweye rockfishes in an area that has been fished heavily for decades and has become less productive. (Goal 1, Objective 3)
- Protect overfished rockfishes, including bocaccio, canary, and yelloweye. (Goal 2, Objective 1)
- Enhance reproductive capacity of benthic and deepwater fish and invertebrate species by prohibiting fishing for these species and allowing fisheries with limited bycatch of these species. (Goal 2, Objective 2)
- Protect rockfishes and other components of a deep benthic community, while allowing the harvest of pelagic finfish. (Goal 2, Objective 3)
- Enhance education and study opportunities by establishing a marine protected area near the Monterey Bay Aquarium Research Institute and Moss Landing Marine

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Laboratories where remotely operated vehicles and other research methods have already generated baseline data. (Goal 3, Objective 1)

- Provide replicate deepwater hard bottom, soft bottom and submarine canyon habitats, in which fishing for benthic species is prohibited, for Soquel Canyon and Point Lobos State Marine Conservation Areas and Big Creek State Marine Reserve. (Goal 3, Objective 2)
- Include and replicate deepwater hard and soft bottom and submarine canyon habitats across a wide range of depth. (Goal 4, Objective 2)
- Minimize negative socio-economic impacts to the pelagic finfish fisheries while protecting benthic habitat within a marine protected area. (Goal 5, Objective 1)
- Minimize negative socio-economic impacts to rockfish fisheries by establishing a state marine conservation area in an area which encompasses the Rockfish Conservation Area, which is already closed to rockfish fishing. (Goal 5, Objective 1)
- Establish marine protected areas that meet Master Plan Framework scientific guidelines regarding preferred size (greater than 18 square miles). (Goal 5, Objective 3)

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Proposed MPA: Ed Ricketts State Marine Conservation Area
Area (sq. mi.): 0.22
Along-shore span (mi): 1
Depth range (ft): 0-74

Primary habitat types: sandy beach, rocky intertidal, surfgrass, shallow hard and soft bottom, kelp bed.

Proposed regulations: Take of all living marine resources is prohibited except the recreational take of finfish by hook-and-line and, north of 36° 38.83' N. Latitude, the commercial take of kelp by hand. Any individual licensed commercial kelp harvester may take no more than 12 tons of kelp from the portion of Administrative Kelp Bed 220 within the Ed Rickets State Marine Conservation Area in any calendar month.

Boundaries: This area is bounded by the mean high tide line and straight lines connecting the following points in the order listed (Figure 9):
36º 36.50' N. lat. 121º 53.37' W. long.;
36º 37.25' N. lat. 121º 53.78' W. long.; and
36º 37.10' N. lat. 121º 54.01' W. long.

Examples of species likely to benefit: mussels, limpets, turban snails, sea stars.

Summary of Objectives: Provide increased protection to a heavily-used area with shallow hard and soft bottom habitats, including kelp beds, while allowing for some traditional consumptive uses. The primary purpose of this area is to provide for recreational opportunities (both consumptive and nonconsumptive) in an area that is minimally impacted by other consumptive activities.

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Detailed Objectives (with reference to regional goal and objective):

- Protect invertebrates and the habitats on which they depend while allowing the harvest of finfish and kelp. (Goal 2, Objective 3)
- Enhance research and study opportunities by establishing a marine protected area which allows selected fishing and prohibits spearfishing close to Lovers Point State Marine Reserve and close to a state marine conservation area which allows spearfishing. (Goal 3, Objective 1)
- Promote opportunity for use of volunteer scuba divers in research and monitoring projects by establishing a state marine conservation area in a location heavily used by scuba divers where volunteer monitoring by REEF already takes place. (Goal 3, Objective 3)
- Minimize negative socio-economic impacts by establishing a state marine conservation area which allows recreational fishing and hand harvest of kelp by local aquaculturists, while affording protection to invertebrates and prohibiting all other commercial take. (Goal 5, Objective 1)

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Figure 9. Ed Ricketts State Marine Conservation Area, Lovers Point State Marine Reserve, and Pacific Grove State Marine Conservation Area.

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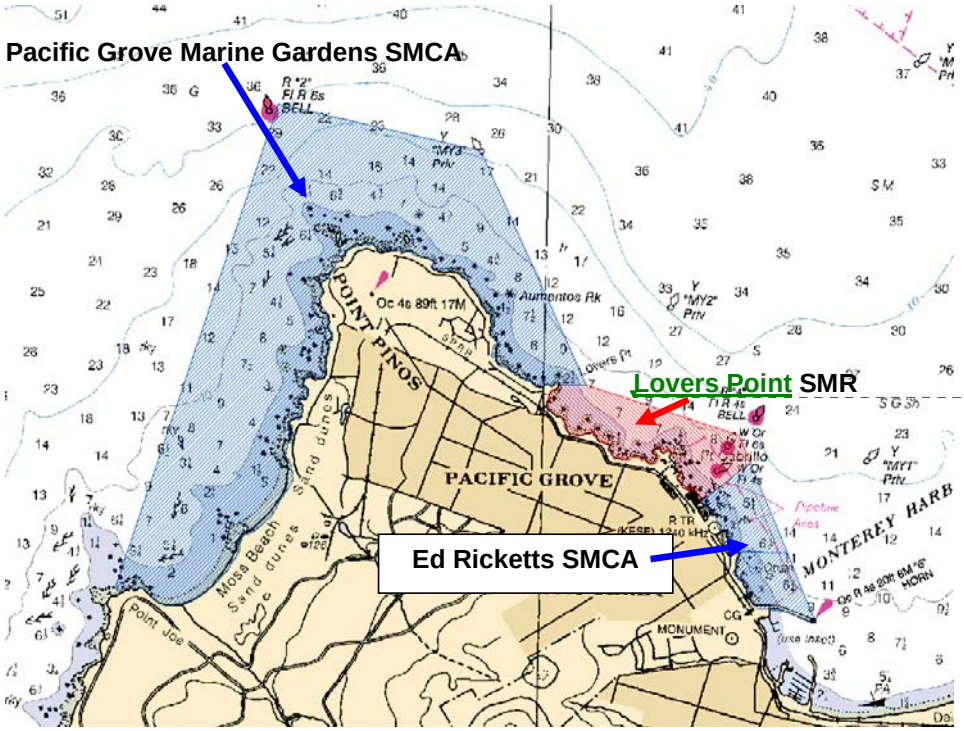

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Proposed MPA: Lovers Point State Marine Reserve
Area (sq. mi.): 0.30
Along-shore span (mi): 1.0
Depth range (ft): 0-88

Primary habitat types: sandy beach, rocky intertidal, surfgrass, shallow hard and soft bottom, kelp bed.

Proposed regulations: No take.

Boundaries: This area is bounded by the mean high tide line and straight lines connecting the following points in the order listed (Figure 9):
36º 37.10' N. lat. 121º 54.09' W. long.;
36º 37.25' N. lat. 121º 53.78' W. long.;
36º 37.38' N. lat. 121º 53.85' W. long.;
36º 37.60' N. lat. 121º 54.75' W. long.; and
36º 37.60' N. lat. 121º 54.91' W. long.

Examples of species likely to benefit: nearshore rockfishes, lingcod, cabezon, kelp greenling, surfperches, California halibut, giant kelp, mussels, limpets, sea stars, southern sea otter, cormorants.

Summary of Objectives: Provide for increased protection through the expansion of an existing state marine reserve in shallow hard and soft bottom habitats in an area close to population centers and used by nonconsumptive divers. The primary goal of this MPA will be to provide for recreational nonconsumptive uses in an area minimally impacted by human take. Additionally this increases the area adjacent to an existing research institution which can facilitate research and monitoring within the MPA.

Detailed Objectives (with reference to regional goal and objective):

- Continue to provide protection to a rich diversity of invertebrates and fish species characteristic of shallow rocky and soft bottom habitat of southern Monterey Bay, while expanding protection to a small reef in slightly deeper water. (Goal 1, Objective1)
- Help protect southern sea otter and marine bird habitat. (Goal 2, Objective 1)
- Protect large individuals of resident nearshore fish species in known nursery area. (Goal 2, Objective 2)
- Enhance scientific research opportunities at site of traditional high research value by expanding protection in adjacent areas and extending the existing state marine reserve alongshore and into deeper water. (Goal 3, Objective 1)
- Enhance recreational non-consumptive diving experience at site of traditional high diving use by expanding protection in adjacent areas and extending the existing state marine reserve alongshore and into deeper water. (Goal 3, Objective 1)
- Benefit from site's location adjacent to Stanford University's Hopkins Marine Station and its use by students for educational and monitoring purposes. (Goal 3, Objective 3)
- Minimize socio-economic impacts by limiting the state marine reserve to a maximum depth of approximately 60 feet (except for Hopkins Deep Reef) which will allow

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scuba divers where volunteer monitoring by REEF already takes place. (Goal 3, Objective 3)
- Enhance recreational fishing within the state marine conservation area through a prohibition on commercial take and by providing for a natural size and age structure of resident finfish species in an adjacent state marine reserve. (Goal 3, Objective 4)
- Allow continued recreational fishing in traditional use area and hand harvest of kelp close to abalone aquaculture facilities. (Goal 5, Objective 1)

Proposed MPA: Carmel Pinnacles State Marine Reserve
Area (sq. mi.): 0.53
Along-shore span (mi): 1.0
Depth range (ft): 69-223

Primary habitat types: rocky pinnacles, kelp bed.

Proposed regulations: No take.

Boundaries: This area is bounded by the straight lines connecting the following points in the order listed (Figure 10):
36º 33.65' N. lat. 121º 57.60' W. long.;
36º 33.65' N. lat. 121º 58.50' W. long.;
36º 33.10' N. lat. 121º 58.50' W. long.;
36º 33.10' N. lat. 121º 57.60' W. long.; and
36º 33.65' N. lat. 121º 57.60' W. long.;

Examples of species likely to benefit: nearshore rockfishes, lingcod, cabezon, kelp greenling, surfperches, giant kelp, bull kelp, sponges, hydrocorals.

Summary of Objectives: Provide for complete protection in an area of complex hard bottom habitat, including kelp beds and pinnacles, is close to port and frequently used by nonconsumptive divers. The primary purpose of this area would be to protect a unique pinnacle area that is accessible to divers for nonconsumptive uses while maintaining similar habitats nearby as open fishing areas.

Detailed Objectives (with reference to regional goal and objective):
- Protect communities associated with high-relief rocky reef habitat (including pinnacles), bull kelp and giant kelp forests, and hydrocorals, in close proximity to each other. (Goal 1, Objective 2)
- Enhance non-consumptive recreational scuba diving experience at a traditional dive site formerly open to fishing. (Goal 3, Objective 1)
- Replicate pinnacle habitat found within Point Lobos State Marine Reserve. (Goal 3, Objective 2)
- Include pinnacle habitat, with dense rockfish populations, sponges, and hydrocorals, within a state marine reserve. (Goal 4, Objective 1)

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Examples of species likely to benefit: invertebrates, including squid.

Summary of Objectives: Continue to provide existing level of protection in an area of diverse shallow habitat characterized by traditional recreational uses.

Detailed Objectives (with reference to regional goal and objective):

- Allow continued recreational harvest of finfish and commercial harvest of kelp by hand in an area of historic recreational use value near Monterey harbor while protecting invertebrates. (Goal 2, Objective 3)
- Maintain an existing state marine conservation area located near the population center of Monterey Peninsula that is accessible for recreational opportunities, both consumptive and non-consumptive. (Goal 3, Objective 1)
- Maintain an existing state marine conservation area that includes a Moss Landing Marine Laboratories long-term monitoring site. (Goal 3, Objective 3)
- Allow for the comparison of a recreational fishing area adjacent to a no-take area (Goal 3, Objective 3)

Deleted: <#>Maintain the general size and shape of the existing state marine conservation area so it will not result in any additional negative socio-economic impact. (Goal 5, Objective 1)
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Proposed MPA: Point Lobos State Marine Reserve
Area (sq. mi.): 5.36
Along-shore span (mi): 4.7
Depth range (ft): 0-408

Primary habitat types: sandy beach, rocky intertidal, surfgrass, shallow hard and soft bottom, pinnacles, kelp bed.

Proposed regulations: No take. Access restricted in some areas due to existing Point Lobos State Reserve regulations but these restrictions will not apply to areas outside the existing Pt. Lobos State Reserve boundaries.

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Boundaries: This area is bounded by the mean high tide line and straight lines connecting the following points in the order listed (Figure 10):
36º 31.70’ N. lat. 121º 55.55’ W. long.;
36º 31.70’ N. lat. 121º 58.25’ W. long.;
36º 28.88’ N. lat. 121º 58.25’ W. long.; and
36º 28.88’ N. lat. 121º 56.30’ W. long.

Examples of species likely to benefit: nearshore rockfishes, lingcod, cabezon, kelp greenling, surfperches, giant kelp, bull kelp, squid, sponges, hydrocorals, cormorants, pelicans, southern sea otter, harbor seal.

Summary of Objectives: Provide for increased complete protection through the expansion of an existing state marine reserve in shallow hard and soft bottom habitats in an area close to population centers and used by nonconsumptive divers. This area is important to the formation of an ecologically sound MPA network component, by linking these habitats to similar habitats in other parts of the region.

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Detailed Objectives (with reference to regional goal and objective):

- Protect area of high species diversity characteristic of the granitic shallow hard bottom habitat within the central coast, and maintain species diversity and abundance as demonstrated by monitoring indicator species. (Goal 1, Objective 1)
- Protect communities associated with a mosaic of sandy and rocky intertidal, kelp bed, shallow rocky reef, shallow sandy bottom, and submarine canyon head habitats in close proximity to each other. (Goal 1, Objective 2)
- Protect natural age and size structure of invertebrate and fish species associated with sandy and rocky intertidal, kelp bed, shallow rocky reef, shallow sandy bottom, and submarine canyon head habitat. (Goal 1, Objective 3)
- Protect natural trophic structure and food webs, including forage species such as squid and coastal pelagic finfish that serve as prey for other fish, marine birds, and marine mammals. (Goal 1, Objective 4)
- Protect ecosystem structure and functions associated with submarine canyon head, rocky reef, and kelp forest communities. (Goal 1, Objective 5)
- Help protect listed marine bird and marine mammal species by protecting forage base. (Goal 2, Objective 1)
- Protect larval sources and enhance reproductive capacity of invertebrates and nearshore finfish with limited movement patterns. (Goal 2, Objective 2)
- Enhance extensive educational and interpretive facilities, including visitor center and docent program, through expansion of an existing state marine reserve. (Goal 3, Objective 1)
- Enhance Partnership for Interdisciplinary Studies of Coastal Oceans (PISCO) monitoring program (which has existing replicate monitoring sites inside and outside the state marine reserve) through expansion of the existing state marine reserve. (Goal 3, Objective 2)
- Replicate pinnacles habitat found in Carmel Pinnacles State Marine Reserve. (Goal 3, Objective 2)
- Enhance existing local high school monitoring program through expansion of the state marine reserve. (Goal 3, Objective 3)
- Protect and enhance recreational diving experience by expanding protection of existing state marine reserve to better ensure protection of large fish. (Goal 3, Objective 4)
- Protect head of Carmel Submarine Canyon and pinnacle habitats within a state marine reserve. (Goal 4, Objective 1)
- Include rocky intertidal, kelp bed, shallow rocky reef, and shallow soft bottom habitats within a state marine reserve, and increase protection of pinnacle habitat. (Goal 4, Objective 2)
- Optimize positive socio-economic benefits by improving protection in area that has particularly high non-consumptive use patterns, including scuba diving and wildlife watching. (Goal 5, Objective 1)
- Establish a marine protected area complex (along with Point Lobos State Marine Conservation Area) that meets Master Plan Framework scientific guidelines for minimum shoreline extent and offshore extent. (Goal 5, Objective 3)

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Proposed MPA: Point Lobos State Marine Conservation Area
Area (sq. mi.): 8.85
Along-shore span (mi): 3.2
Depth range (ft): 268-1858

Primary habitat types: shallow and deep hard bottom, shallow and deep soft bottom, shallow and deep submarine canyon.

Proposed regulations: Take of all living marine resources is prohibited except commercial and recreational take of salmon (*Oncorhynchus spp.*), albacore (*Thunnus alalunga*), and spot prawn (*Pandalus platyceros*).

Boundaries: This area is bounded by the state water line offshore and straight lines connecting the following points in the order listed unless otherwise stated (Figure 10):
36º 31.70' N. lat. 121º 58.25' W. long.;
36º 31.70' N. lat. 122º 01.30' W. long.; thence southward along the state water line to
36º 28.88' N. lat. 122º 01.37' W. long.;
36º 28.88' N. lat. 121º 58.25' W. long.; and
36º 31.70' N. lat. 121º 58.25' W. long.

Examples of species likely to benefit: shelf and slope rockfishes, lingcod, sponges, hydrocorals, cormorants, pelicans, southern sea otter, harbor seal.

Summary of Objectives: Provide for increased protection of benthic finfishes in a diverse area containing shallow and deep, and hard and soft habitats, while minimizing impact to rockfish fisheries, through the incorporation of part of the Rockfish Conservation Area into the MPA, and salmon and spot prawn fisheries. This area is important to the formation of an ecologically sound MPA network component, by linking these habitats to similar habitats in other parts of the region.

Detailed Objectives (with reference to regional goal and objective):

- Protect communities associated with area with shallow hard and soft bottom, deep hard and soft bottom, and shallow and deep submarine canyon habitats across a wide depth range and in close proximity to each other. (Goal 1, Objective 2)
- Help protect populations of overfished rockfish (including bocaccio, canary and yelloweye) and help protect forage species (including coastal pelagic finfish) for listed marine birds. (Goal 2, Objective 1)
- Enhance reproductive capacity of benthic fish species by prohibiting fishing for them in deep water. (Goal 2, Objective 2)
- Enhance reproductive capacity of benthic fish species by only allowing fishing for selected pelagic finfishes and spot prawn (by trap), where bycatch of benthic fishes is minimal. (Goal 2, Objective 2)
- Provide an opportunity for comparative studies in Soquel Canyon and Portuguese Ledge State Marine Conservation Areas which have similar habitats. (Goal 3, Objective 1)
- Minimize negative socio-economic impacts by allowing fishing for salmon, albacore and spot prawn, and by incorporating a portion of the Rockfish Conservation Area (closed to groundfish take) and Essential Fish Habitat trawl closure. (Goal 5, Objective 1)

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Deleted: <#>Provide (fished) replicate deepwater hard bottom, soft bottom and submarine canyon habitat for Portuguese Ledge and Big Creek State Marine Reserves. (Goal 3, Objective 2)¶

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- Help protect populations of overfished rockfish species including bocaccio, yelloweye, and canary. (Goal 2, Objective 1)
- Protect forage base for listed marine birds and marine mammals as well as overfished rockfish species. (Goal 2, Objective 1)
- Protect larval sources and enhance reproductive capacity of shelf species including rockfishes. (Goal 2, Objective 2)
- Establish a marine protected area near a terrestrial state park where an adjacent PISCO subtidal monitoring site exists. (Goal 3, Objective 1)
- Include submarine canyon head habitat found in the Soquel Canyon and Point Lobos State Marine Conservation Areas and Point Lobos State Marine Reserve. (Goal 3, Objective 2)
- Include submarine canyon head within a state marine reserve. (Goal 4, Objective 1)
- Include shallow hard and soft bottom, and shallow canyon habitat within a state marine reserve, including an area of broad continental shelf within a larger area of primarily narrow continental shelf. (Goal 4, Objective 2)
- Minimize negative socio-economic impacts by incorporating a portion of the Rockfish Conservation Area (closed to groundfish take), and considering existing squid fishing grounds. (Goal 5, Objective 1)
- Establish a marine protected area complex (along with Point Sur State Marine Conservation Area) that meets preferred Master Plan Framework scientific guidelines for size. (Goal 5, Objective 3)

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Figure 11. Pt. Sur State Marine Reserve and Pt. Sur State Marine Conservation Area.

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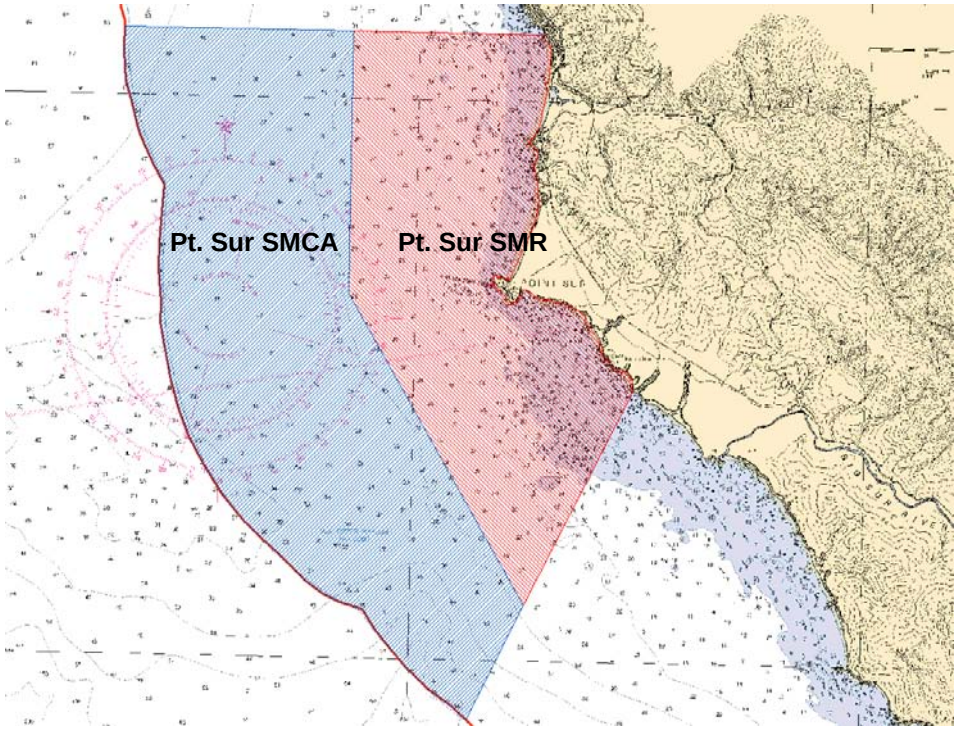

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Proposed MPA: Point Sur State Marine Conservation Area
Area (sq. mi.): 14.14
Along-shore span (mi): 6.4
Depth range (ft): 165-700

Primary habitat types: shallow hard and soft bottom.

Proposed regulations: Take of all living marine resources is prohibited except commercial and recreational take of salmon (*Onchorhynchus spp.*) and albacore (*Thunnus alalunga*).

Boundaries: This area is bounded by the state water line offshore and straight lines connecting the following points in the order listed unless otherwise stated (Figure 11):
36º 20.60' N. lat. 121º 55.75' W. long.;
36º 20.60' N. lat. 121º 58.25' W. long.; thence southward along the state water line to
36º 14.45' N. lat. 121º 54.37' W. long.;
36º 15.50' N. lat. 121º 53.75' W. long.;
36º 18.26' N. lat. 121º 55.75' W. long.; and
36º 20.60' N. lat. 121º 55.75' W. long.

Examples of species likely to benefit: nearshore and shelf rockfishes, lingcod, cabezon, kelp greenling, surfperches, giant kelp, squid, Dungeness crab, spot prawn, murres, cormorants, southern sea otter.

Summary of Objectives: Provide for increased protection of a diverse area containing shallow hard and soft habitats, kelp beds, and associated fish and invertebrate species while minimizing impact to shelf rockfish fisheries, through the incorporation of part of the Rockfish Conservation Area into the MPA, and to the salmon fishery. This area is important to the formation of an ecologically sound MPA network component, by linking these habitats to similar habitats in other parts of the region. In addition, unique habitats in federal waters are adjacent to this area and may be connected if appropriate in future processes.

Detailed Objectives (with reference to regional goal and objective):

- Protect area of high species diversity associated with shallow hard and soft bottom habitats where the continental shelf is relatively broad. (Goal 1, Objective 1 and 2)
- Protect natural age and size structure of invertebrate and fish species associated with shallow rocky reef and soft bottom habitat. (Goal 1, Objective 3)
- Protect natural trophic structure and food webs, including forage species such as juvenile rockfish, squid, and coastal pelagic finfish that serve as prey for other fish, marine birds, and marine mammals. (Goal 1, Objective 4)
- Provide protection to communities associated with an area that contains a persistent upwelling plume and generally southerly flow, well-suited to provide larval dispersal to other areas. (Goal 1, Objective 5)
- Help maintain populations of overfished rockfish species including bocaccio, yelloweye, and canary. (Goal 2, Objective 1)
- Protect forage base for listed marine birds and marine mammals as well as overfished rockfish species. (Goal 2, Objective 1)

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- Protect larval sources and enhance reproductive capacity of benthic shelf species including rockfishes. (Goal 2, Objective 2)
- Minimize negative socio-economic impacts by incorporating a portion of the Rockfish Conservation Area (closed to groundfish take), and by allowing the harvest of salmon and albacore. (Goal 5, Objective 1)
- Establish a marine protected area complex (along with Point Sur State Marine Reserve) that meets preferred Master Plan Framework scientific guidelines for size. (Goal 5, Objective 3)

Proposed MPA: Big Creek State Marine Conservation Area
Area (sq. mi.): 10.11
Along-shore span (mi): 2.5
Depth range (ft): 0-1964

Primary habitat types: sandy beach, rocky intertidal, surfgrass, shallow hard and soft bottom, deep hard and soft bottom, shallow and deep submarine canyon, pinnacles, kelp bed.

Proposed regulations: Take of all living marine resources is prohibited except the commercial and recreational take of salmon (*Onchorhynchus spp.*), albacore (*Thunnus alalunga*), and spot prawn (*Pandalus platyceros*) west of a straight line connecting the following two points (approximately 25 fathoms):
36° 07.20' N. lat. 121° 39.00' W. long.; and
36° 05.20' N. lat. 121° 38.00' W. long.

Boundaries: This area is bounded by the state water line offshore and straight lines connecting the following points in the order listed unless otherwise stated (Figure 12):
36º 07.20' N. lat. 121º 38.00' W. long.;
36º 07.20' N. lat. 121º 42.90' W. long.; thence southward along the state water line to
36º 05.20' N. lat. 121º 41.24' W. long.; and
36º 05.20' N. lat. 121º 37.10' W. long.

Examples of species likely to benefit: nearshore, shelf, and slope rockfishes, lingcod, cabezon, kelp greenling, surfperches, squid, giant kelp, murres, cormorants, southern sea otter.

Summary of Objectives: Provide for increased protection of a diverse area containing shallow and deep, and hard and soft habitats, kelp beds, submarine canyons, and associated fish and invertebrate species while minimizing impact to shelf rockfish fisheries, through the incorporation of part of the Rockfish Conservation Area into the MPA, and to the spot prawn and salmon fisheries. This area is important to the formation of an ecologically sound MPA network component, by linking these habitats to similar habitats in other parts of the region.

Detailed Objectives (with reference to regional goal and objective):
- Protect area of high species diversity associated with shallow and deep water habitats, including submarine canyon. (Goal 1, Objective 1)
- Protect communities associated with sandy beach, rocky intertidal, shallow hard and soft bottom, surfgrass and kelp beds, deep hard and soft bottom, and shallow and deep submarine canyon habitat in close proximity to each other. (Goal 1, Objective 2)

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Proposed MPA: Big Creek State Marine Reserve
Area (sq. mi.): 12.35
Along-shore span (mi): 3.3
Depth range (ft): 0-2393

Primary habitat types: sandy beach, rocky intertidal, surfgrass, shallow hard and soft bottom, deep hard and soft bottom, shallow and deep submarine canyon, pinnacles, kelp bed.

Proposed regulations: No take.

Boundaries: This area is bounded by the state water line offshore and straight lines connecting the following points in the order listed unless otherwise stated (Figure 12):
36º 05.20' N. lat. 121º 37.10' W. long.;
36º 05.20' N. lat. 121º 41.24' W. long.; thence southward along the state water line to
36º 02.65' N. lat. 121º 39.70' W. long.; and
36º 02.65' N. lat. 121º 35.15' W. long.

Examples of species likely to benefit: nearshore, shelf, and slope rockfishes, lingcod, cabezon, kelp greenling, surfperches, spot prawn, squid, giant kelp, murres, cormorants, southern sea otter.

Summary of Objectives: Provide for increased complete protection, through expansion of an existing state marine reserve, of a diverse area containing shallow and deep, and hard and soft habitats, kelp beds, submarine canyons, and associated fish and invertebrate species while minimizing impact to shelf rockfish fisheries through the incorporation of part of the Rockfish Conservation Area into the MPA. This area is important to the formation of an ecologically sound MPA network component, by linking these habitats to similar habitats in other parts of the region.

Detailed Objectives (with reference to regional goal and objective):

- Protect area of high species diversity associated with shallow and deep water habitats, including submarine canyon. (Goal 1, Objective 1)
- Protect communities associated with sandy beach, rocky intertidal, shallow hard and soft bottom, surfgrass and kelp beds, deep hard and soft bottom, and shallow and deep submarine canyon habitat in close proximity to each other. (Goal 1, Objective 2)
- Protect natural age and size structure of invertebrate and fish species associated with sandy and rocky intertidal, surfgrass and kelp beds, shallow and deep rocky reef, shallow and deep sandy bottom, and shallow and deep submarine canyon habitat. (Goal 1, Objective 3)
- Protect natural trophic structure and food webs, including forage species such as juvenile rockfish, squid, and coastal pelagic finfish that serve as prey for other fish, marine birds, and marine mammals. (Goal 1, Objective 4)
- Protect full range of ecosystem functions in an area between upwelling zones. (Goal 1, Objective 5)
- Help maintain populations of overfished rockfish species including bocaccio, yelloweye, and canary. (Goal 2, Objective 1)

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Detailed Objectives (with reference to regional goal and objective):

- Protect area of particularly high species diversity including fish, invertebrates, kelp, marine birds, and marine mammals, including major rookeries containing California sea lion, northern elephant seal, harbor seal, Steller sea lion, and northern fur seal. (Goal 1, Objective 1)
- Protect communities associated with extensive and high value intertidal zone which will be subject to additional visitation due to conversion from private to public ownership of land. (Goal 1, Objective 1)
- Protect communities associated with a mosaic of habitat types, including sandy beach with diverse cobble size, rocky intertidal, surfgrass bed, kelp forest, pinnacles, and shallow hard and soft bottom, in close proximity to each other. (Goal 1, Objective 2)
- Protect natural age and size structure of species associated with sandy beach, rocky intertidal, surfgrass bed, kelp forest, pinnacles, and shallow hard and soft bottom habitat. (Goal 1, Objective 3)
- Protect natural trophic structure and food webs, including forage species such as juvenile rockfish, squid, and coastal pelagic finfish that serve as prey for other fish, marine birds, and marine mammals. (Goal 1, Objective 4)
- Protect forage base for marine birds and marine mammals and eliminate disturbances associated with fishing activities. (Goal 1, Objective 5)
- Protect communities associated with an upwelling zone where larval dispersion to other areas is likely. (Goal 1, Objective 5)
- Help protect populations of overfished rockfish species including bocaccio, yelloweye, and canary. (Goal 2, Objective 1)
- Protect larval sources and enhance reproductive capacity of nearshore fish and invertebrate species. (Goal 2, Objective 2)
- Replicate within a state marine reserve the range of habitats found at Point Sur and Point Buchon State Marine Reserves in an area that includes a PISCO monitoring site. (Goal 3, Objective 2)
- Enhance classroom component of research and monitoring as related to the Friends of the Elephant Seal organization. (Goal 3, Objective 3)
- Include pinnacle habitat within a state marine reserve. (Goal 4, Objective 1)
- Include and replicate sandy beach, rocky intertidal, surfgrass bed, kelp forest, pinnacles, and shallow hard and soft bottom habitat. (Goal 4, Objective 2)
- Increase positive socio-economic benefits by protecting an area with exceptionally high natural heritage values, including education, wildlife viewing, and tourism. (Goal 5, Objective 1)
- Establish a marine protected area complex (along with Piedras Blancas State Marine Conservation Area) that meets Master Plan Framework scientific guidelines for preferred size. (Goal 5, Objective 3)

Deleted: <#>Establish a state marine reserve adjacent to a newly expanded terrestrial state park which has high visitor rates, interpretive facilities, docent presence, and parking. (Goal 3, Objective 1) ¶

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Summary of Objectives: Provide for increased protection of a diverse area containing shallow hard and soft habitats, kelp beds, pinnacles, and associated fish and invertebrate species in an area receiving increased public visitation due to marine mammal viewing opportunities, while minimizing impact to the salmon fishery. This area is important to the formation of an ecologically sound MPA network component, by linking these habitats to similar habitats in other parts of the region.

Detailed Objectives (with reference to regional goal and objective):

- Protect benthic areas with high species diversity and maintain benthic species diversity and abundance, consistent with natural fluctuations, of populations in shallow hard and soft bottom. (Goal 1, Objective 1)
- Protect communities associated with area with shallow hard and soft bottom in close proximity to each other. (Goal 1, Objective 2)
- Protect natural age and size structure of invertebrate and fish species associated with shallow rocky reef and soft bottom habitat. (Goal 1, Objective 3)
- Protect offshore forage base for seabird and marine mammal populations. (Goal 1, Objective 5)
- Help maintain populations of overfished rockfish species including bocaccio, yelloweye, and canary. (Goal 2, Objective 1)
- Protect larval sources and enhance reproductive capacity of benthic shelf species including rockfishes. (Goal 2, Objective 2)
- Establish a marine protected area complex (along with Piedras Blancas State Marine Reserve) that meets Master Plan Framework scientific guidelines for preferred size. (Goal 5, Objective 3)

Proposed MPA: Cambria State Marine Reserve
Area (sq. mi.): 3.23
Along-shore span (mi): 3.1
Depth range (ft): 0-137

Primary habitat types: sandy beach, rocky intertidal, surfgrass, shallow hard and soft bottom, kelp bed.

Proposed regulations: Take of all living marine resources is prohibited.

Boundaries: This area is bounded by the mean high tide line and straight lines connecting the following points in the order listed (Figure 14):
35º 32.50’ N. lat. 121º 05.60’ W. long.;
35º 32.50’ N. lat. 121º 07.00’ W. long.;
35º 30.50’ N. lat. 121º 05.00’ W. long.; and
35º 30.50’ N. lat. 121º 03.40’ W. long.

Examples of species likely to benefit: nearshore rockfish, squid, mussels, turban snails, limpets

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Summary of Objectives: Provide for a high level of protection of a diverse area containing shallow hard and soft habitats, kelp beds, pinnacles, and associated fish and invertebrate species adjacent to an existing land based preserve and research facility.

Detailed Objectives (with reference to regional goal and objective):

- Protect area of particularly high species diversity including fish, invertebrates, kelp, marine birds, and marine mammals, including major rookeries containing California sea lion, northern elephant seal, harbor seal, Steller sea lion, and northern fur seal. (Goal 1, Objective 1)
- Protect communities associated with a mosaic of habitat types, including sandy beach with diverse cobble size, rocky intertidal, surfgrass bed, kelp forest, pinnacles, and shallow hard and soft bottom, in close proximity to each other. (Goal 1, Objective 2)
- Protect natural age and size structure of species associated with sandy beach, rocky intertidal, surfgrass bed, kelp forest, pinnacles, and shallow hard and soft bottom habitat. (Goal 1, Objective 3)
- Protect natural trophic structure and food webs, including forage species such as juvenile rockfish, squid, and coastal pelagic finfish that serve as prey for other fish, marine birds, and marine mammals. (Goal 1, Objective 4)
- Protect larval sources and enhance reproductive capacity of nearshore fish and invertebrate species. (Goal 2, Objective 2)
- Provide protection to nearshore shelf rockfish species, cabezon, and kelp greenling through the prohibition of commercial and recreational fishing. (Goal 2, Objective 3)
- Replicate within a state marine reserve the range of shallow habitats found at Point Sur and Point Buchon State Marine Reserves. (Goal 3, Objective 2)
- Provide research benefits from existing subtidal and intertidal monitoring sites in this area. (Goal 3, Objective 2)
- Include and replicate sandy beach, rocky intertidal, surfgrass bed, kelp forest, pinnacles, and shallow hard and soft bottom habitat. (Goal 4, Objective 2)

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Detailed Objectives (with reference to regional goal and objective):

- Protect estuarine area with high marine bird diversity. (Goal 1, Objective 1)
- Protect communities associated with area with diversity of estuarine habitats, including open channels and mud flats, in close proximity to each other. (Goal 1, Objective 2)
- Protect natural age, size structure, and genetic diversity of fish and invertebrate species, especially elasmobranches and flatfishes, characteristic of largest estuarine system within the central coast. (Goal 1, Objective 3)
- Protect natural structure and food web of estuarine system, including invertebrate forage base for marine birds. (Goal 1, Objective 4)
- Help protect listed marine birds and southern sea otter by protecting feeding area. (Goal 2, Objective 1)
- Enhance reproductive capacity of invertebrate and fish estuarine species by prohibiting take in important nursery area. (Goal 2, Objective 2)
- Provide educational and interpretive resources by establishing a state marine reserve adjacent to a museum, a terrestrial state park, and within the Morro Bay Estuarine Reserve. (Goal 3, Objective 1)
- Include and replicate representative central coast estuarine habitat within a state marine reserve. (Goal 3, Objective 2)
- Include estuarine habitat within a state marine reserve. (Goal 4, Objective 1)
- Minimize negative socio-economic impacts by establishing a state marine reserve in an area that is already closed to fishing, and where non-consumptive values such as wildlife viewing are likely to be enhanced. (Goal 5, Objective 1)

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Detailed Objectives (with reference to regional goal and objective):

- Protect estuarine area with high marine bird diversity. (Goal 1, Objective 1)
- Protect communities associated with area with diversity of estuarine habitats, including open channels and mud flats, in close proximity to each other. (Goal 1, Objective 2)
- Protect natural age, size structure, and genetic diversity of fish and invertebrate species, especially elasmobranches and flatfishes, characteristic of largest estuarine system within the central coast. (Goal 1, Objective 3)
- Protect natural structure and food web of estuarine system, including invertebrate forage base for marine birds. (Goal 1, Objective 4)
- Help protect listed marine birds and southern sea otter by protecting feeding area. (Goal 2, Objective 1)
- Enhance reproductive capacity of invertebrate and fish estuarine species by prohibiting take in important nursery area. (Goal 2, Objective 2)
- Provide educational and interpretive resources by establishing a state marine recreational management area with full protection of marine fish, invertebrate, and algae species adjacent to a museum, a terrestrial state park, and within the Morro Bay Estuarine Reserve. (Goal 3, Objective 1)
- Include with estuarine habitat within a state marine recreational management area. (Goal 4, Objective 1)
- Minimize negative socio-economic impacts by establishing a state marine recreational management area in a location that has experienced relatively little fishing effort but has been a traditional waterfowl hunting area. (Goal 5, Objective 1)

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Proposed MPA: Point Buchon State Marine Reserve
Area (sq. mi.): 6.66
Along-shore span (mi): 2.9
Depth range (ft): 0-208

Primary habitat types: sandy beach, rocky intertidal, shallow hard and soft bottom, pinnacles, kelp bed.

Proposed regulations: No take.

Boundaries: This area is bounded by the mean high tide line and straight lines connecting the following points in the order listed (Figure 16):
35º 15.25' N. lat. 120º 54.00' W. long.;
35º 15.25' N. lat. 120º 56.00' W. long.;
35º 11.00' N. lat. 120º 52.40' W. long.; and
35º 13.30' N. lat. 120º 52.40' W. long.

Examples of species likely to benefit: nearshore and shelf rockfishes, lingcod, cabezon, kelp greenling, surfperches, California halibut, squid, shearwaters, pelicans, southern sea otter.

Summary of Objectives: Provide for complete protection of a diverse area containing shallow hard and soft habitats, kelp beds, pinnacles, and associated fish and invertebrate species,

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while benefiting from additional protection due to an adjacent national security closure. This area is important to the formation of an ecologically sound MPA network component, by linking these habitats to similar habitats in other parts of the region.

Detailed Objectives (with reference to regional goal and objective):

- Protect area of particularly high species diversity including fish, invertebrates, kelp, marine birds, and marine mammals. (Goal 1, Objective 1)
- Protect communities associated with diverse habitats, including sandy beach, rocky intertidal, kelp forest, and shallow hard and soft bottom habitat, in close proximity to each other. (Goal 1, Objective 2)
- Protect natural age and size structure of species associated with sandy beach, rocky intertidal, kelp forest, and shallow hard and soft bottom habitat. (Goal 1, Objective 3)
- Protect natural trophic structure and food webs in area representative of shallow hard and soft bottom habitats south of Morro Bay. (Goal 1, Objective 4)
- Protect full range of ecosystem functions in an area between two upwelling zones. (Goal 1, Objective 5)
- Help protect populations of nearshore rockfish in an area that has traditionally received relatively high fishing effort. (Goal 2, Objective 1).
- Protect larval sources and enhance reproductive capacity of nearshore fish and invertebrate species. (Goal 2, Objective 2)
- Establish a state marine reserve which encompasses an existing Cooperative Research and Assessment of Nearshore Ecosystems (CRANE) monitoring site, and which includes baseline data collected for power plant impact monitoring. (Goal 3, Objective 1)
- Establish a state marine reserve adjacent to a newly expanded terrestrial state park which has high visitor rates, interpretive facilities, docent presence, and parking. (Goal 3, Objective 1)
- Replicate within a state marine reserve the range of habitats found at fished sites south of Diablo Canyon Nuclear Power Plant. (Goal 3, Objective 2)
- Include pinnacle habitat within a state marine reserve. (Goal 4, Objective 1)
- Include and replicate sandy beach, rocky intertidal, kelp forest, pinnacles, and shallow hard and soft bottom habitat. (Goal 4, Objective 2)
- Establish a marine protected area complex (along with Point Buchon State Marine Conservation Area) that meets Master Plan Framework scientific guidelines for size. (Goal 5, Objective 3)

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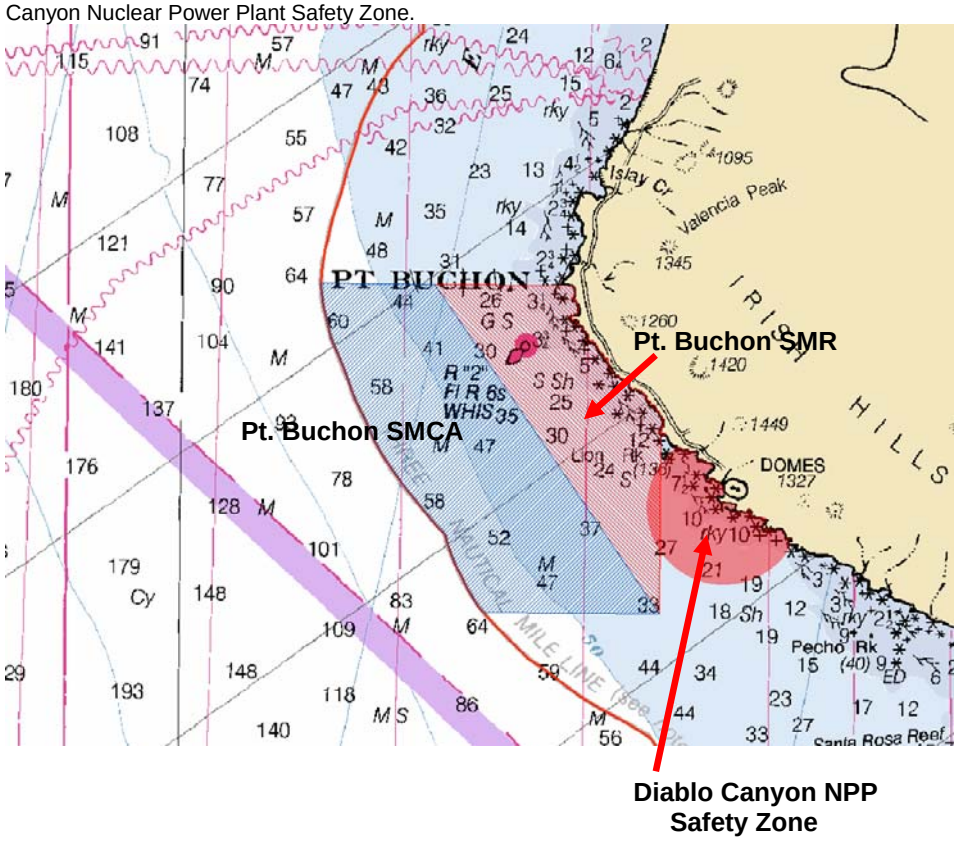
Figure 16. Pt. Buchon State Marine Reserve and Pt. Buchon State Marine Conservation Area including the Diablo Canyon Nuclear Power Plant Safety Zone.



Proposed MPA: Point Buchon State Marine Conservation Area
Area (sq. mi.): 11.55
Along-shore span (mi): 5.9
Depth range (ft): 191-377

Primary habitat types: shallow hard and soft bottom, deep hard and soft bottom.

Proposed regulations: Take of all living marine resources is prohibited except commercial and recreational take of salmon (*Onchorhynchus spp.*) and albacore (*Thunnus alalunga*).

Boundaries: This area is bounded by the state water line offshore and straight lines connecting the following points in the order listed unless otherwise stated (Figure 16):
35º 15.25' N. lat. 120º 56.00' W. long.;
35º 15.25' N. lat. 120º 57.80' W. long.; thence southward along the state water line to
35º 11.00' N. lat. 120º 55.20' W. long.; and
35º 11.00' N. lat. 120º 52.40' W. long.;

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with the Vandenberg Air Force Base's national defense mission and details on cooperative enforcement and monitoring.

Examples of species likely to benefit: nearshore and shelf rockfishes, lingcod, cabezon, kelp greenling, surfperches, California halibut, Dungeness crab, rock crab, squid, shearwaters, pelicans, southern sea otter.

Summary of Objectives: Provide for complete protection of a diverse area containing shallow hard and soft habitats, kelp beds, and associated fish and invertebrate, while benefiting from protection provided by an existing state marine reserve and restrictions on vessel traffic, including fishing vessels, due to the presence of Vandenberg Air Force Base. This area is important to the formation of an ecologically sound MPA network component, by linking these habitats to similar habitats in other parts of the region.

Detailed Objectives (with reference to regional goal and objective):

- Protect area with high marine bird, marine mammal, fish, and invertebrate species diversity and abundance. (Goal 1, Objective 1)
- Protect communities associated with area with unique oceanographic conditions in transition zone near a biogeographical regional boundary, including sandy beach, rocky intertidal, kelp forest, and hard and soft bottom habitat, and in close proximity to each other. (Goal 1, Objective 2)
- Protect natural age and size structure of Nearshore Fishery Management Plan species which occur within the central coast. (Goal 1: Objective 3)
- Protect trophic structure and food web in area representative of shallow habitats south of Morro Bay. (Goal 1, Objectives 4)
- Protect ecosystem structure and functions in representative shallow habitat in southern end of central coast. (Goal 1, Objective 5)
- Increase ecological benefits to an area containing a mosaic of shallow hard and soft bottom habitats through the expansion of an existing state marine reserve. (Goal 1, Objective 5)
- Help protect marine bird and marine mammal species of concern by protecting forage base adjacent to colonies and rookeries. (Goal 2, Objective 1)
- Protect larval sources and enhance reproductive capacity of benthic fishes, invertebrates, and coastal pelagic finfish. (Goal 2, Objective 2)
- Establish a state marine reserve which encompasses an existing PISCO monitoring site, a Multi-Agency Intertidal Network (MARINe) monitoring site, and a Point Reyes Bird Observatory (PRBO) study site. (Goal 3, Objective 1)
- Replicate with a state marine reserve the same range of habitats found at fished sites at Point Sal. (Goal 3, Objective 2)
- Include and replicate within a state marine reserve sandy beach, rocky intertidal, and shallow hard and soft bottom habitats. (Goal 4, Objective 2)
- Establish a state marine reserve that meets preferred Master Plan Framework scientific guidelines for size. (Goal 5, Objective 3)

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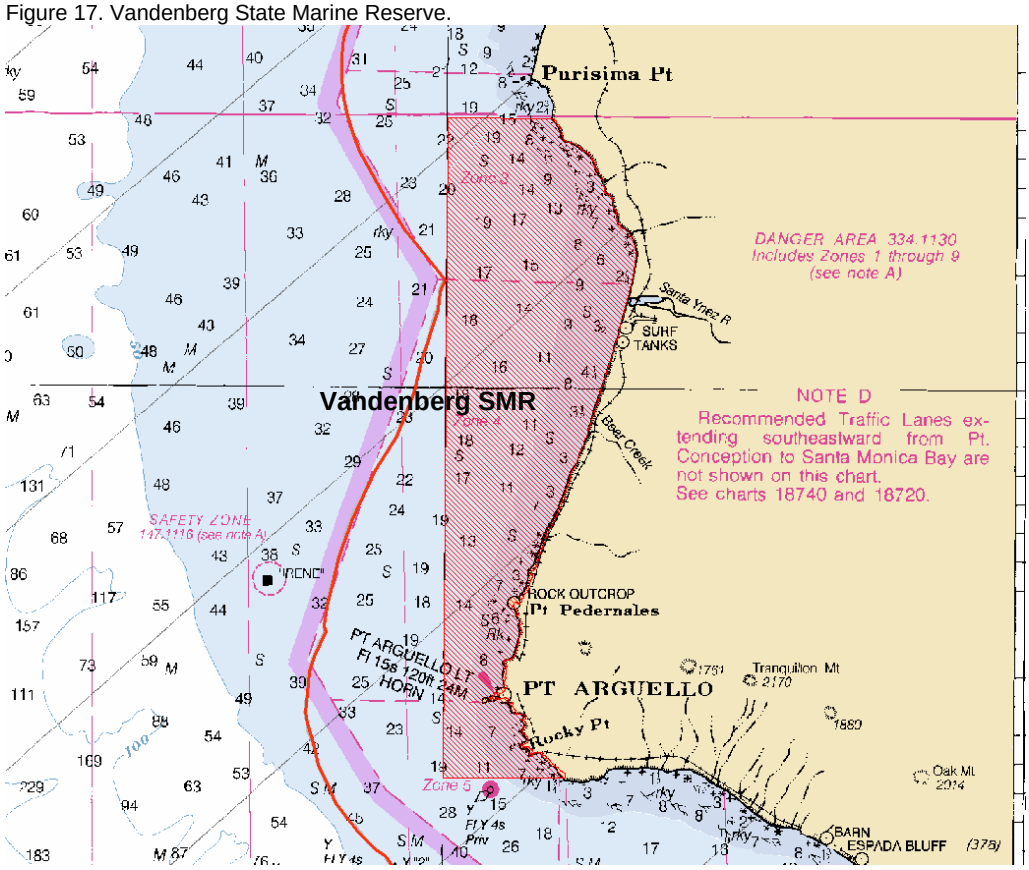
Figure 17. Vandenberg State Marine Reserve.



8.4.2. General Activities and Locations

Baseline Scientific Monitoring and Research plan

Monitoring to support adaptive management of MPA networks or network components (a) begins with understanding of baseline conditions and (b) proceeds over time to monitor changes expected to result from the establishment of Marine Protected areas. Prior to full implementation, or concurrent with implementation of new or expanded MPAs, baseline data are needed to help guide future decisions on the effectiveness of the network component in meeting the goals of the MLPA and specific objectives of individual MPAs. These baseline indicators comprise a core set of biological and socioeconomic variables that will be an integral component of the MPAs' long term monitoring and where some urgency exists to commence data collection activities. Thus, these baseline indicators represent some, but not all, of the data categories needed for monitoring the MPA network.

Specifically, the baseline indicators fulfill the following three criteria.

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1. Each will be useful for evaluating performance relative to the statewide, Central Coast regional, and MLPA goals and the individual MPA-specific objectives;
2. Each is likely to be highly sensitive to the changed management status of the MPAs following designation: Therefore, priority should be given to collecting data on these indicators as soon as possible relative to implementation of the MPAs; and
3. Practical scientifically-valid methods already exist for gathering data on each indicator.

Selection of these indicators was informed by consideration of the Central Coast regional and MPA specific goals and objectives and the broader set of long-term monitoring needs identified in Table 6. Following are lists of potential bio-physical and human use data collection programs ranked in priority for baseline data needs. Each includes estimates for the first year costs for the Central Coast project area. These costs would form the basis of estimates for long-term costs for future study regions, but should not be considered equivalent to annual costs for a long term monitoring plan and associated costs to support adaptive management. The final data collection programs will depend upon both the final set of MPAs selected and implementation dates.

Potential Bio-Physical Baseline Data Collection Programs

Indicator: Distribution, diversity, relative abundance, and sizes of species and habitat attributes for deep canyons, coral, and rocky reef habitats.
Priority: High
Description: This program would use submersible submarine surveys to study deepwater species and habitats inside and outside of designated MPAs in the Central Coast. Surveys would focus on approximately 60-80 species of fish and 20-30 species of invertebrates at depths ranging from 50-300 meters at approximately 34 sites (17 MPAs) and would require approximately one sea day per site.
Relation to Existing Programs: These data are not being collected by existing programs.
Estimated Cost: $1,600,000

Indicator: Distribution, diversity, relative abundance, and sizes of species and habitat attributes for kelp forest habitats.
Priority: High
Description: This program would use SCUBA surveys to study kelp forest species and habitats inside and outside of designated MPAs in the Central Coast. Surveys would focus on approximately 25 species of fish, 30 species of invertebrates, and 10 species of algae at approximately 30 sites (15 MPAs).
Relation to Existing Programs: This program would augment existing monitoring programs.
Estimated Cost: $400,000

Indicator Data: Distribution, diversity, relative abundance, and sizes of species and habitat attributes for kelp forest habitats.
Priority: High
Description: This program use fishing gear surveys to study kelp forest species inside and outside of designated MPAs with kelp forest habitats in the Central Coast. Surveys would focus on 25 species of fish at approximately 30 sites (15 MPAs) and would require multiple days of surveys at each location.

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Deleted: Figure 18 below, has five tiers:

Deleted: <#>The top tier includes the five goals of the MLPA that relate to baseline data collection as well as other MPA goals not included in the MLPA that should be addressed to support adaptive management¶
<#>The second tier breaks the goals of the MLPA and other MPA goals into distinct components and converts them into questions¶
<#>The third tier breaks these goal-based questions into more focused, answerable questions¶
<#>The fourth tier outlines baseline data collection programs that will answer the focused, answerable questions¶
<#>The fifth tier outlines the data required for each baseline data collection program¶

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Placeholder to describe data needs and activities to acquire those data¶

Deleted: This document sets forth a set of programs for collecting data on baseline indicators concurrent with implementation of the Central Coast network of state MPAs. These baseline indicators comprise a core set of biological and socioeconomic variables which fulfill the following three criteria.¶

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Relation to Existing Programs: These data are not being collected by existing programs.
Estimated Cost: $250,000

Indicator Data: Distribution, diversity, relative abundance, and sizes of species and habitat attributes for soft bottom habitats.
Priority: Medium
Description: This program would use sled or ROV surveys to study soft bottom species and habitats inside and outside of designated MPAs in the Central Coast. Surveys would focus on fish at approximately 10 sites (5 MPAs based).
Relation to Existing Programs: These data are not being collected by existing programs.
Estimated Cost: $400,000

Indicator Data: Distribution, diversity, relative abundance, and sizes of species and habitat attributes for rocky intertidal habitats.
Priority: Medium
Description: This program would use visual surveys to study rocky intertidal species and habitats inside and outside of designated MPAs in the Central Coast. Surveys would focus on algae and invertebrates at approximately 28 sites (14 MPAs).
Relation to Existing Programs: This program would augment existing monitoring programs.
Estimated Cost: $200,000

Indicator Data: Distribution, diversity, relative abundance, and sizes of species and habitat attributes for estuarine habitats
Priority: Low
Description: This program would study estuarine species and habitats at designated MPAs in the Central Coast (2 MPAs).
Relation to Existing Programs: Programs to gather these data may already exist at proposed MPAs in the Central Coast. Such programs need to be researched.
Estimated Cost: Up to $500,000 depending on existing programs.

Indicator Data: Distribution, diversity, relative abundance, and sizes of species and habitat attributes for sandy beach habitats
Priority: Low
Description: This program would use tag and recapture programs and visual and SCUBA surveys to study sandy beach species and habitats in less than 15 meter depths inside and outside of designated MPAs in the Central Coast. Surveys would focus on fish, invertebrates, and birds at all MPAs with sandy beach habitats.
Relation to Existing Programs: These data are not being collected by existing programs.
Estimated Cost: $200,000

Potential Human-Use Baseline Data Collection Programs

Indicator Data: Fine-scale spatial data on effort and harvest of commercial consumptive users.
Priority: High
Description: This program would use transponders on a sample of the commercial fishing fleet in order to gather information on the effort and harvest of these users. This program would also develop a protocol to be used with the transponder information.

Deleted: <#>Each will be useful for evaluating performance relative to the statewide, Central Coast regional, and MPA-specific goals and objectives;¶
<#>Each is likely to be highly sensitive to the changed management status of the MPAs following designation: Therefore, priority should be given to collecting data on these indicators as soon as possible relative to implementation of the MPAs; and¶
<#>Practical scientifically-valid methods already exist for gathering data on each indicator.¶
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Long-term and ongoing Monitoring¶

Deleted: Similar to the baseline program, ongoing monitoring is directed by the specific objectives of the individual MPAs within the regional network component as well as the overarching objectives of the regional component as a whole and those of the MLPA. For each MPA, specific monitoring activities linked to the MPA's objectives are provided here along with the specific indicators being monitored. The frequency of monitoring is intended to provide sufficient data to determine effectiveness of the regional component as a whole as well as the individual MPA's contribution to the overall effectiveness. Final determinations on effectiveness of the region's network component will be made based upon the network component as a whole, though adaptive management may occur at the scale of individual MPAs, groups of MPAs, or the entire regional network component. Table 5 lists each MPA, the goals of the MLPA it is intended to meet, the MPA specific objectives, the overarching questions necessary to determine if the objectives have been met, and the general monitoring activities and frequency of monitoring. Following the table is a summary of the monitoring plan necessary to conduct the activities listed in Table 5.¶

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Relation to Existing Programs: These data would complement the logbook information that is collected for the commercial squid and spot prawn fisheries.
Estimated Cost: $500,000

Indicator Data: Cost and earnings data for commercial consumptive users.
Priority: High
Description: This program would collect data on cost and earnings of commercial fishermen before and after MPA implementation.
Relation to Existing Programs: These data are not being collected by existing programs.
Estimated Cost: $300,000

Indicator Data: CRFS data, intercept surveys, logbook data for recreational consumptive users
Priority: High
Description: Catch and fishing effort data for recreational consumptive users (including commercial passenger fishing vessels) are currently being collected from a variety of sources. This program will assimilate, compile, and analyze this existing information to make it more usable in assessing MPAs in the Central Coast Study Region.
Relation to Existing Programs: These data are already being collected, but the resulting information has not been synthesized.
Estimated Cost: $100,000

Indicator Data: CRFS data, intercept surveys, logbook data for recreational consumptive users
Priority: High
Description: Catch and fishing effort data for recreational consumptive users (including commercial passenger fishing vessels) are currently being collected from a variety of sources. This program will expand the collection of these data in order to better understand assess MPAs in the Central Coast Study Region
Relation to Existing Programs: These data are already being collected, but collection programs need to be expanded.
Estimated Cost: $300,000

Indicator Data: GIS data for recreational consumptive users
Priority: High
Description: New data using Geographic Information Systems (GIS) needs to be collected to better understand the actions of recreational consumptive users.
Relation to Existing Programs: This new data would complement the CRFS, intercept surveys, and logbook data already being collected.
Estimated Cost: $200,000

Indicator Data: Non-consumptive effort data.
Priority: High
Description: This program would measure effort (number of trips, number of dives, etc.) of non-consumptive users across time, space, and user-groups. Information on effort would also be linked to ecosystem attributes. This program would focus on core non-consumptive user-groups, including divers, kayakers, and wildlife viewers (whale, bird, tipepool).
Relation to Existing Programs: These data are not being collected by existing programs.

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Estimated Cost: $400,000

Indicator Data: Non-consumptive welfare data.
Priority: High
Description: This program would measure welfare of non-consumptive users using indicators like travel cost measured by recording the zip code of users. Information would be gathered across time, space, and user group and focus on core non-consumptive user groups including divers, kayakers, and wildlife viewers (whale, bird, tipepool).
Relation to Existing Programs: These data are not being collected by existing programs.
Estimated Cost: $200,000 (Estimated cost dependent on combination with effort data collection program)

Indicator Data: Non-consumptive user knowledge, attitudes, and perceptions.
Priority: High
Description: This program would gather data on the knowledge, attitudes, and perceptions of non-consumptive users across time, space, and user-group. Information would be gathered for core non-consumptive user groups including divers, kayakers, and wildlife viewers (whale, bird, tipepool). Data would b gathered by means of surveys, group sessions, data mining, and other methods.
Relation to Existing Programs: These data are not being collected by existing programs.
Estimated Cost: $100,000 (Estimated cost dependent on combination with effort and welfare data collection programs)

Indicator Data: Stated importance data for commercial consumptive users.
Priority: Medium
Description: This program would expand upon the data collected by Ecotrust by conducting stated importance surveys on a regular short-term basis (e.g. annually) with commercial fishermen. This kind of information might be used to address gaps in other data on commercial consumptive users.
Relation to Existing Programs: This program would expand upon the past Ecotrust study.
Estimated Cost: $100,000

Indicator Data: Cost and earnings data for greater communities that include commercial consumptive users
Priority: Medium
Description: This program would collect data on cost and earnings of communities that include commercial fishermen (i.e. including receivers, processors, and other related parties) before and after MPA implementation.
Relation to Existing Programs: These data are not being collected by existing programs.
Estimated Cost $200,000 (Estimated cost dependent on combination with cost and earnings data collection program for only fishermen)

Indicator Data: Stated preference data for recreational consumptive users
Priority: Medium
Description: These data would be collected to measure the knowledge, attitudes, and perceptions of recreational consumptive users in relation to MPAs by means of surveys, group sessions, data mining, and other methods.
Relation to Existing Programs: These data are not being collected by existing programs.

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Estimated Cost: $500,000 - $700,000

Indicator Data: Effort, welfare, and knowledge, attitudes, and perceptions data for non-core non-consumptive user groups.
Priority: Medium
Description: This program would expand the above three programs to include non-core non-consumptive user groups (e.g. surfers, boaters, etc.).
Relation to Existing Programs: These data are not being collected by existing programs.
Goals Addressed: Goals 1, 3, and R1.
Overarching Questions Addressed: G1a, G3a-1, G3a-2, G3b-1, R1-3, R1-4 **Estimated Cost:** $400,000 (Estimated cost dependent on combination with effort, welfare, and knowledge, attitudes, and perceptions data collection programs

Long-term and ongoing Monitoring

Similar to the baseline program, ongoing monitoring is directed by the specific objectives of the individual MPAs within the regional network component as well as the overarching objectives of the regional component as a whole and those of the MLPA. It should be noted that some of the MPA objectives will not require monitoring but will be met upon adoption. These objectives are listed in Table 5 below. Other MPA objectives related to the protection of the physical habitat types will not require monitoring but only an initial verification of the presence of those habitats, as significant long-term changes to basic substrate types are not expected to occur within MPAs or the central coast region in general. For the remainder of the MPA objectives, specific monitoring activities linked to them are provided here along with the specific indicators to be monitored. The sampling design and frequency of monitoring will incorporate considerations of spatial and temporal variation in ecological and human-related patterns and processes. In any case, sampling frequency will vary from annually to every five years depending on the the information being gathered and spatial location.

Final determinations on effectiveness of the region's network component will be made based upon the network component as a whole, though adaptive management may occur at the scale of individual MPAs, groups of MPAs, or the entire regional network component. Table 6 lists the goals of the MLPA the various MPAs expected to help achieve those goals, the general objectives, the overarching questions necessary to determine if the objectives have been met, and the general monitoring activities. Following the table is a summary of the monitoring plan necessary to conduct the activities listed.

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Table 5. Central coast MPA objectives that will be met (or mostly met) by adoption and implementation of the MPA. For full objectives see section 8.4.1 above.

MLPA Goal By Number	MPAs	General Objective	Overarching Question	Monitoring Activity
2	Soquel Canyon SMCA Portuguese Ledge SMCA Point Lobos SMCA Point Buchon SMCA	Protect rockfishes and other components of a deep benthic community, while allowing some harvest	Is take of rockfish prohibited while other harvest is allowed allowed?	Completed by adoption of MPA; will require monitoring of use to confirm
2	Elkhorn Slough SMP	Provide for traditional recreational consumptive and nonconsumptive uses while offering some protection due to the prohibition of commercial fishing.	Does the MPA allow for recreational and nonconsumptive uses and prohibit commercial ones?	Completed by adoption of MPA; will require monitoring of use to confirm
2	Carmel Bay SMCA	Allow continued recreational harvest of finfish and commercial harvest of kelp by hand in an area of historic recreational use value near Monterey harbor while protecting invertebrates.	Does the MPA allow continued uses and prohibit take of invertebrates?	Completed by adoption of MPA; will require monitoring of use to confirm
3	Elkhorn Slough SMR Soquel Canyon SMCA Portuguese Ledge SMCA Ed Ricketts SMCA Lovers Point SMR Pacific Grove Marine Gardens SMCA Carmel Bay SMCA Point Lobos SMR Point Lobos SMCA Big Creek SMCA Big Creek SMR Cambria SMR Morro Bay SMRMA Morro Bay SMR Point Buchon SMR Vandenberg SMR	Provide increased research, education and study opportunities	Is MPA adjacent or near to research facilities or sites and do research and education activities increase over time?	Partially completed by adoption of MPA, track research and education activities.
3	Big Creek SMCA Big Creek SMR	Provide opportunities afforded by a nearby terrestrial reserve…to link classroom curricula.	Does MPA provide opportunity to link to classroom curricula?	Completed by adoption of MPA; will require monitoring of use to confirm
3	Big Creek SMCA Big Creek SMR	Provide opportunities for collaborative research projects involving commercial fishermen, including a possible study on the impact of salmon fishing.	Does MPA provide opportunities for collaborative research?	Completed by adoption of MPA; will require monitoring of use to confirm
3	Ed Ricketts SMCA Pacific Grove Marine Gardens SMCA	Promote opportunity for use of volunteer scuba divers in research and monitoring projects by establishing a state marine conservation area in a location heavily used by scuba divers where volunteer monitoring …already takes place.	Is the MPA in an area where volunteer monitoring takes place?	Completed by adoption of MPA; will require monitoring of use to confirm

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MLPA Goal By Number	MPAs	General Objective	Overarching Question	Monitoring Activity
3	Pacific Grove Marine Gardens SMCA Carmel Bay SMCA	Maintain an existing state marine conservation area located near a population center that is accessible for recreational opportunities, both consumptive and non-consumptive.	Is the MPA near the population center and accessible to recreational opportunities?	Completed by adoption of MPA
3	Carmel Bay SMCA	Allow for the comparison of a recreational fishing area adjacent to a no-take area.	Does the MPA allow for take/no-take comparison?	Completed by adoption of MPA
5	Point Lobos SMR Point Lobos SMCA Big Creek SMCA Big Creek SMR Point Buchon SMR Point Buchon SMCA	Establish marine protected area complexes that meet Master Plan Framework scientific guidelines for minimum size	Does complex meet minimum guidelines?	Completed by adoption of MPA
5	Soquel Canyon SMCA Portuguese Ledge SMCA Point Sur SMR Point Sur SMCA Piedras Blancas SMR Piedras Blancas SMCA Vandenberg SMR	Establish marine protected areas or complexes that meet Master Plan Framework scientific guidelines regarding preferred size.	Does the MPA meet the preferred size guidelines?	Completed by adoption of MPA
5	Ed Ricketts SMCA	Minimize negative socio-economic impacts by establishing a state marine conservation area which allows recreational fishing and hand harvest of kelp by local aquaculturists, while affording protection to invertebrates and prohibiting all other commercial take.	Does MPA allow recreational fishing and hand harvest of kelp and prohibit other take?	Completed by adoption of MPA
5	Pacific Grove Marine Gardens SMCA	Allow continued recreational fishing in traditional use area and hand harvest of kelp close to abalone aquaculture facilities.	Are recreational fishing and kelp harvest allowed in the area?	Completed by adoption of MPA
5	Morro Bay SMRMA	Minimize negative socio-economic impacts by establishing a state marine recreational management area in a location that has experienced relatively little fishing effort but has been a traditional waterfowl hunting area.	Does the area allow waterfowl hunting while prohibiting other take?	Completed by adoption of MPA
5	Morro Bay SMR	Minimize negative socio-economic impacts by establishing a state marine reserve in a location that is already closed to fishing…	Is the area already closed to fishing?	Completed by adoption of MPA

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Table 6. Central coast MPA monitoring activities based upon MLPA Goals and general individual MPA objectives. For full objectives see section 8.4.1 above.

MLPA Goal By Number	MPAs	General Objective	Overarching Question	Potential Monitoring Activity
1	Año Nuevo SMR Greyhound Rock SMCA Soquel Canyon SMCA Portuguese Ledge SMCA Point Lobos SMR Point Sur SMR Point Sur SMCA Big Creek SMCA Big Creek SMR Piedras Blancas SMR Piedras Blancas SMCA Cambria SMR Morro Bay SMRMA Morro Bay SMR Point Buchon SMR Vandenberg SMR	Protect area of high species diversity…and maintain species diversity and abundance…	Does species richness and/or diversity stay the same or increase in MPAs relative to areas of similar habitat adjacent to and distant from MPAs?	Measure community structure and species composition including habitat forming species within and outside MPAs over time
1	Año Nuevo SMR Soquel Canyon SMCA Portuguese Ledge SMCA Carmel Pinnacles SMR Point Lobos SMR Point Lobos SMCA Point Sur SMR Point Sur SMCA Big Creek SMCA Big Creek SMR Piedras Blancas SMR Piedras Blancas SMCA Cambria SMR Morro Bay SMRMA Morro Bay SMR Point Buchon SMR Vandenberg SMR	Protect marine communities associated with various diverse habitats	Is the habitat present and does it persist in a viable state within the MPA?	Monitor habitat presence, composition, and status over time

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Deleted: Protect area with diversity of estuarine habitats…

Deleted: Is the habitat present and does it persist in a viable state within the MPA?

Deleted: Monitor habitat presence, composition, and status over time

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MLPA Goal By Number	MPAs	General Objective	Overarching Question	Potential Monitoring Activity
1	Año Nuevo SMR Greyhound Rock SMCA Elkhorn Slough SMR Elkhorn Slough SMP Point Lobos SMR Point Sur SMR Point Sur SMCA Big Creek SMCA Big Creek SMR Piedras Blancas SMR Piedras Blancas SMCA Cambria SMR Morro Bay SMRMA Morro Bay SMR Point Buchon SMR Vandenberg SMR	Protect natural size and age structure and genetic diversity of various marine species populations	Do focal species inside marine reserves increase in size, numbers, and biomass relative to areas of similar habitat adjacent to and distant from MPAs?	Measure size range, density, and makeup of focal species assemblages within, adjacent to and far from MPAs
1	Año Nuevo SMR Point Lobos SMR Point Sur SMR Point Sur SMCA Piedras Blancas SMR Piedras Blancas SMCA Cambria SMR Morro Bay SMRMA Morro Bay SMR Point Buchon SMR Vandenberg SMR	Protect natural trophic structure and food web including forage base …for listed marine birds and marine mammals as well as higher trophic level fish…	Is the food web integrity greater within the MPA than outside: Do the abundance and size/age structure of key predator and prey species differ inside and outside MPAs in areas of comparable habitat?	Map trophic relationships then estimate biomass for different trophic levels and measure average weight of higher trophic level species where possible
1	Año Nuevo SMR Point Lobos SMR Big Creek SMR Point Buchon SMR Vandenberg SMR	Protect ecosystem structure and functions associated with various habitats	Is the proportion of area within which focal species are restored to or maintained at self replenishing levels greater within the MPA than in similar habitats outside?	Use community structure and focal species size range and density data to model ability to replenish
1	Elkhorn Slough SMR Elkhorn Slough SMP	Protect estuarine area with high bird diversity.	Does MPA contain high bird diversity and is this diversity maintained?	Monitor bird diversity within and outside the area over time.
1	Elkhorn Slough SMR Elkhorn Slough SMP	Protect area with diversity of estuarine habitats…	Is the habitat present and does it persist in a viable state within the MPA?	Monitor habitat presence, composition, and status over time
1	Elkhorn Slough SMR Morro Bay SMRMA Morro Bay SMR	Protect natural structure and food web of estuarine system…	Is the food web integrity greater within the MPA than outside: Do the abundance and size/age structure of key predator and prey species differ inside and outside MPAs in areas of comparable habitat?	Map trophic relationships then estimate biomass for different trophic levels and measure average weight of higher trophic level species where possible
1	Soquel Canyon SMCA Portuguese Ledge SMCA	Help restore overfished species by maintaining large individuals	Do focal species inside MPAs increase in size, numbers, and biomass relative to areas of similar habitat adjacent to and distant from MPAs?	Measure size range, density, and makeup of focal species assemblage within, near and distant from MPA over time

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MLPA Goal By Number	MPAs	General Objective	Overarching Question	Potential Monitoring Activity
1	Point Sur SMR Point Sur SMCA	Provide protection to species associated with an area that contains a persistent upwelling plume and generally southerly flow, well-suited to provide larval dispersal to other areas.	Proportion of area within which focal species are restored to or maintained at self replenishing levels	Use community structure and focal species size range and density data to model ability to replenish
2	Ed Ricketts SMCA	Protect invertebrates and the habitats on which they depend while allowing the harvest of finfish and kelp.	Does species richness and/or diversity stay the same or increase in MPAs relative to areas of similar habitat adjacent to and distant from MPAs?	Measure community structure and species composition including habitat forming species within and outside MPAs over time
2	Año Nuevo SMR Greyhound Rock SMCA Elkhorn Slough SMR Soquel Canyon SMCA Portuguese Ledge SMCA Point Lobos SMR Point Lobos SMCA Point Sur SMR Point Sur SMCA Big Creek SMCA Big Creek SMR Piedras Blancas SMR Piedras Blancas SMCA Cambria SMR Point Buchon SMR Point Buchon SMCA Vandenberg SMR	Protect larval source and enhance reproductive capacity of various species including overfished species	Do reserves retain large, mature, fecund individuals of selected species and do recruitment rates of selected species change over time inside marine reserves versus areas outside?	Measure size range, density, and makeup of focal species assemblage and relative recruitment[24] rates of selected species inside and outside MPAs
2	Lovers Point SMR Cambria SMR Morro Bay SMRMA Morro Bay SMR	Protect large individuals of resident marine species in known nursery area.	Do focal species inside MPAs increase in size, numbers, and biomass relative to areas of similar habitat adjacent to and distant from MPAs?	Measure size range, density, and makeup of focal species assemblage within, near and distant from MPA over time

Deleted: Monitor bird diversity within and outside the area over time.

Deleted: Does MPA contain high bird diversity and is this diversity maintained?

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Deleted: Protect estuarine area with high bird diversity

Deleted: Protect area with diversity of estuarine habitats…

Deleted: Monitor habitat presence, composition, and status over time

Deleted: Upon implementation and every third year thereafter

Deleted: Is the habitat present and does it persist in a viable state within the MPA?

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Deleted: Measure size range, density, and makeup of focal species assemblages within, adjacent to and far from MPAs

Deleted: Protect natural age, size structure, and genetic diversity of some invertebrate species, such as fat innkeeper worms, characteristic of one of largest estuarine systems within the central coast.

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Deleted: Do focal species inside marine reserves increase in size, numbers, and biomass relative to areas of similar habitat adjacent to and distant from MPAs?

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[24] **Recruitment**: The amount of fish added to the exploitable stock each year due to growth and/or migration into the fishing area. For example, the number of fish that grow to become vulnerable to the fishing gear in one year would be the recruitment to the fishable population that year. This term is also used in referring to the number of fish from a year class reaching a certain age. For example, all fish reaching their second year would be age 2 recruits. (Source: "Technical Terms" **NOAA's National Marine Fisheries Service Northeast Fisheries Science Center** http://www.nefsc.noaa.gov/techniques/tech_terms.html)

MLPA Goal By Number	MPAs	General Objective	Overarching Question	Potential Monitoring Activity
2	Año Nuevo SMR Greyhound Rock SMCA Elkhorn Slough SMR Moro Cojo Lagoon SMR Point Lobos SMR Point Sur SMR Point Sur SMCA Big Creek SMCA Big Creek SMR Morro Bay SMRMA Morro Bay SMR Vandenberg SMR	Help protect various marine birds and mammals by protecting feeding, roosting, and nesting habitat…	Are foraging, roosting, and nesting behaviors different inside MPA versus outside and is disturbance greater in fished areas?	Use visual surveys of area before and after implementation to measure frequency of disturbance from sea and shore-based activities
3	Piedras Blancas SMR	Enhance classroom component of research and monitoring as related to the Friends of the Elephant Seal organization.	Relative measure of ability to convey conservation message using local examples	Survey of students in the program
3	Elkhorn Slough SMR Moro Cojo Lagoon SMR Carmel Pinnacles SMR Point Lobos SMR Point Sur SMR Big Creek SMR Piedras Blancas SMR Cambria SMR Morro Bay SMRMA[25] Morro Bay SMR Point Buchon SMR Vandenberg SMR	Replicate representative habitats within state marine reserves	Is the habitat present and does it persist in a viable state within the MPA?	Monitor habitat presence, composition, and status over time
3	Año Nuevo SMR Point Lobos SMR Point Sur SMR Pt. Buchon SMR	Site a marine protected area adjacent to a terrestrial state park or state reserve …	Is MPA adjacent to a State Park or Reserve?	Año Nuevo State Reserve, Point Lobos State Reserve, Point Sur State Historic Park, and Montana de Oro Completed by adoption of MPA
3	Lovers Point SMR Pacific Grove Marine Gardens SMCA Carmel Pinnacles SMR Point Lobos SMR	Enhance recreational non-consumptive diving experience at site of traditional high diving use…	Are non-consumptive recreational experiences in areas subject to minimal disturbance improving? What are the attitudes and perceptions of users and their recreational experience and how has that changed over time?	Surveys of divers to determine relative satisfaction
3	Pacific Grove Marine Gardens SMCA	Enhance recreational fishing within the state marine conservation area through a prohibition on commercial take and by providing for a natural size and age structure of resident finfish species in an adjacent state marine reserve.	Is recreational fishing success (catch per unit of effort) improving along with changes in focal species size range, abundance and population structure	Surveys of fishermen and fishery dependent data from CRFS program combined with measuring size range, density, and makeup of focal species assemblage

[25] Though not a true SMR, the Morro Bay SMRMA includes a component of no-take area equivalent in protection to an SMR

Deleted: Provide for traditional recreational consumptive and nonconsumptive uses while offering some protection due to the prohibition of commercial fishing.

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Deleted: Does the MPA allow for recreational and nonconsumptive uses and prohibit commercial ones?

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Deleted: **Moro Cojo Estuary** ... [65]

Deleted: Help protect listed marine birds by protecting feeding, roosting, and nesting habitat.

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Deleted: Monitor habitat presence, composition, and status over time

Deleted: **Soquel Canyon SM** ... [66]

Deleted: Protect and replicate representative estuarine habitat in central coast region within a state marine reserve.

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MLPA Goal By Number	MPAs	General Objective	Overarching Question	Potential Monitoring Activity
4	Año Nuevo SMR Elkhorn Slough SMR Moro Cojo Estuary SMR Carmel Pinnacles SMR Point Lobos SMR Point Sur SMR Big Creek SMR Piedras Blancas SMR Cambria SMR Morro Bay SMR Point Buchon SMR Vandenberg SMR	Include and replicate various habitats in state marine reserves	Is the habitat present and does it persist in a viable state within the MPA?	Monitor habitat presence, composition, and status over time
5	Soquel Canyon SMCA Portuguese Ledge SMCA Point Lobos SMCA	Minimize negative socio-economic impacts to the various fisheries while protecting benthic finfishes	Is take of benthic fishes prohibited while take of other species allowed and is catch per unit of effort in these fisheries maintained?	Partially completed by adoption of MPA. Track catch and effort in subject fisheries.
5	Point Lobos SMR Piedras Blancas SMR	Optimize positive socio-economic benefits by improving protection in area that has particularly high non-consumptive use patterns…	Are non-consumptive recreational experiences in areas subject to minimal disturbance improving? What are the attitudes and perceptions of users and their recreational experience and how has that changed over time?	Surveys of non-consumptive users
5	Point Sur SMR Point Sur SMCA Big Creek SMCA Big Creek SMR Point Buchon SMCA	Minimize negative socio-economic impacts by incorporating a portion of the Rockfish Conservation Area …and considering other fisheries	Is take of rockfish prohibited while take of other species continues?	Partially completed by adoption of MPA. Track catch and effort in subject fishery.

Deleted: Protect area with high species diversity associated with submarine canyon…

Deleted: Does species richness and/or diversity stay the same or increase in MPAs relative to areas of similar habitat adjacent to and distant from MPAs?

Deleted: Measure community structure and species composition including habitat forming species within and outside MPAs over time

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Deleted: Is the habitat present and does it persist in a viable state within the MPA?

Deleted: Monitor habitat presence, composition, and status over time

Deleted: Help protect area of diverse habitat including shallow hard and soft bottom, deep hard and soft bottom, and submarine canyon…

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Long-term Monitoring Plan

Placeholder to describe the specific monitoring activities and locations intended to complete the above plan.

Outreach, Interpretation and Education plan

The Department will hire a full-time outreach and education specialist to address a variety of Marine outreach needs, including MLPA. Additionally entry level staff will be hired in each region who will help implement outreach plans and provided direct contact with various user groups in the field.

Placeholder to include specifics on materials (e.g., pamphlets, brochures), signage, and educational programs.

Enforcement plan

In order to facilitate enforcement, the Department proposes using a multi-tiered effort that targets high risk areas (areas prone to infractions) with higher levels of enforcement while maintaining sufficient enforcement in all MPAs. In certain areas, formal and informal partnerships will be relied upon to increase the number of "eyes-on-the-water", person-hours of enforcement, and visibility of enforcement personnel. In some cases, formal memoranda of understanding (MOUs) will be developed to allow fund transfer between partner agencies.

Table 7 lists each MPA in the central coast region along with enforcement considerations. Staff needs to implement this plan are discussed in subsection 8.4.3.

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Table 7. Enforcement considerations for central coast region MPAs.

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MPA Name	Primary Enforcement Method	Potential Partnerships/ Assistance	Special Considerations	Special Equipment Needs
Año Nuevo SMR	Ocean/Vessel patrol with some shoreline patrol	California State Parks	14 to 16 miles to get patrol skiff to the area. Large Patrol vessel is about 25 miles away.	Boat launch at Año Nuevo-need to be able to trailer small boat closer to the area. Some aircraft patrol.
Greyhound Rock SMCA	Ocean/Vessel patrol with some shoreline patrol		Same issues as Año Nuevo	Same issues as Año Nuevo
Elkhorn Slough SMR	Shoreline patrol with some small skiff patrol	Elkhorn Slough Foundation, NOAA/Elkhorn Slough National Estuarine Research Reserve		Boats
Elkhorn Slough SMP	Shoreline patrol with some small skiff patrol	Elkhorn Slough Foundation, NOAA/Elkhorn Slough National Estuarine Research Reserve		Boats

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MPA Name	Primary Enforcement Method	Potential Partnerships/ Assistance	Special Considerations	Special Equipment Needs
Moro Cojo Estuary SMR	Shoreline patrol with some small skiff patrol	Elkhorn Slough Foundation, NOAA/Elkhorn Slough National Estuarine Research Reserve		
Soquel Canyon SMCA	Ocean/Vessel patrol	Monterey Bay Marine Sanctuary	Heavily fished area - will require extensive on water patrol.	Small skiff and large boat patrol. Some aircraft patrol.
Portuguese Ledge SMCA	Ocean/Vessel patrol	Monterey Bay Marine Sanctuary	Not connected to shore - requires boat patrol	Small skiff and large boat patrol. Some aircraft patrol.
Ed Ricketts SMCA	Shoreline patrol and some boat patrol	Coast Guard, Monterey and Pacific Grove Police Departments. Monterey Bay Aquarium and Hopkins Marine Station. Monterey Bay Marine Sanctuary	Heavily used area. Many non-consumptive users.	Small boat patrol.
Lovers Point SMR	Shoreline patrol and small skiff patrol	Stanford University/Hopkins Marine Station. Monterey Bay Aquarium. Coast Guard. Monterey Police Department. Monterey Bay Marine Sanctuary	Heavily used area. Many non-consumptive users.	Boats
Pacific Grove SMCA	Shoreline patrol and small skiff patrol	State Parks. Monterey Bay Sanctuary. Pacific Grove PD. Coast Guard	Heavily used area. Many non-consumptive users.	Boats
Carmel Pinnacles SMR	Ocean/Vessel patrol	Monterey Bay Sanctuary		
Carmel Bay SMCA	Shoreline patrol and Ocean/Vessel patrol	Monterey Bay Sanctuary. Carmel PD		Boats
Point Lobos SMR	Shoreline patrol and Ocean/Vessel patrol	California State Parks. Monterey Bay Sanctuary.	High use area for divers.	Boats
Point Lobos SMCA	Ocean/Vessel patrol	California State Parks. Monterey Bay Sanctuary.		Boats
Point Sur SMR	Ocean/Vessel patrol with some shoreline patrol	Coast Guard	Distance from harbor. Weather hampers ability to patrol area by boat.	Large and small boats for patrol. Aircraft patrol
Point Sur SMCA	Ocean/Vessel patrol	Coast Guard	Distance from harbor. Weather hampers ability to patrol area by boat.	Large and small boats for patrol. Aircraft patrol

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MPA Name	Primary Enforcement Method	Potential Partnerships/ Assistance	Special Considerations	Special Equipment Needs
Big Creek SMCA	Ocean/Vessel patrol		Remote area. Only large boat patrol can patrol area.	Large patrol boat and aircraft.
Big Creek SMR	Shoreline patrol and Ocean/Vessel patrol	University of California/Big Creek Reserve	Remote area. Only large boat patrol can patrol area.	Large patrol boat and aircraft.
Piedras Blancas SMR	Shoreline patrol and Ocean/Vessel patrol		Fairly remote	Small and large patrol boats and aircraft.
Piedras Blancas SMCA	Ocean/Vessel patrol		Fairly remote	Small and large patrol boats and aircraft.
Cambria SMR	Shoreline patrol with some boat patrol	University of California/Ken Norris Rancho Marino Reserve		Boats
Morro Bay SMRMA	Shoreline patrol with some small boat patrol.	State Parks.	Multi use area with hunting, fishing, and non consumptive users.	Boats
Morro Bay SMR	Shoreline patrol with small and large boat patrol	California State Parks		
Point Buchon SMR	Ocean/Vessel patrol with shoreline patrol	California State Parks	Diablo Canyon Power Plant proximity.	Large and small patrol boats
Point Buchon SMCA	Ocean/Vessel patrol		Diablo Canyon Power Plant proximity.	Large and small patrol boats
Vandenberg SMR	Shoreline patrol and Ocean/Vessel patrol	Vandenberg Air Force Base	Access to Vandenberg for shoreline patrol. Limited patrol by aircraft	Large and small patrol boats

Enforcement Personnel

Table 3. Central coast enforcement personnel with marine emphasis (August 2006).

Pigeon Point to Big Sur		**Big Sur to Point Conception**		**Total**
Land Based	Patrol Boat	Land Based	Patrol Boat	
1 Lt. / 2 Wardens	1 Lt. / 2 Wardens 1 patrol boat	2 Wardens	2 Lt. / 4 Wardens 2 patrol boats	4 Lieutenants 10 Wardens

The Department has 14 marine emphasis enforcement staff located within the central coast project covering the area between Pigeon Point and Point Conception. The four lieutenants and ten wardens have a primary emphasis of at sea and shore based marine patrol within this large area. There are also inland wardens that work the non-marine issues along the same

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area of the central coast. These wardens deal with all inland hunting, fishing, pollution, habitat loss, and other related enforcement issues. This small group of marine emphasis and land based wardens will not be able to adequately handle the added responsibilities of enforcement of these MPAs without assistance. Currently the Law Enforcement Division has 65 vacant positions and is unable to redirect enforcement personnel or current new hires to a new mandate.

The 2006/2007 Governors Budget created nine new enforcement positions (including engineer positions) to assist with MLPA, MLMA, and Halibut Trawl Bill implementation. These positions cannot be filled, trained, and deployed until at least September of 2008. Until that time, the Department will not implement identified patrol efforts in most of the new MPAs along the central coast.

The Department will be unable to fill enforcement positions designated to MLPA enforcement until it acquires a new hiring list in 2007. The hiring process includes testing, background investigation, hiring, and training. This process takes 18 to 24 months to bring a new warden into the field. The Department is having a difficult time with recruitment and retention of wardens due to salary disparities with other law enforcement agencies. Our warden recruitment is not currently able to keep up with attrition due to retirements and separations. Unless the problem with recruitment and retention is fixed, we do not anticipate being able to place wardens into these new MLPA positions in the foreseeable future.

Current MPA enforcement will be accomplished using existing personnel resources. Positions cannot be redirected to concentrate on MLPA enforcement due to duties and responsibilities currently facing enforcement. The Department will use MLPA funding to pay overtime to existing wardens to patrol these new areas. Current enforcement staff on the central coast will be supplemented by wardens to assist with patrol effort within the MPAs through directed enforcement details paid through MPA funding.

MPA's will be patrolled by many techniques including large patrol boats, small patrol skiffs, aircraft, and by wardens on the coast. Each MPA has special needs requiring specialized patrol efforts. Areas closer to ports will require less effort to get to, but because of their proximity to population centers, will have a higher use than remote areas. Remote areas may get fewer users, but require a more significant travel. This last patrol would include large boat or aircraft patrol.

Training

Coastal Wardens working within the central coast area of California will receive training on the new suite of marine protected areas in their patrol districts. This training will include but is not limited to area boundaries and area specific regulations.

Timeline for Implementation of New Enforcement Staff

Enforcement of MPAs in the central coast project will be implemented in phases as DFG enforcement staff levels are augmented to handle the extra work load created by these new MPAs.

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Year One (2006-2007)

Start the hiring process for the nine new enforcement positions authorized by the 2006/2007 budget. If no problems are encountered in the hiring process, the Department expects these wardens to be in the field by the end 2008. One to two years are required to complete the hiring process and training to bring a new warden into the field. The ability to hire and train new staff is dependent on State budget, hiring constraints, and academy availability.

During the first year, enforcement will be done with existing DFG enforcement staff. Wardens will receive training on the new MPA boundaries and regulations. Generally speaking, MPAs close in proximity to existing staff will get more patrol effort than those areas that are more remote. The Department will direct our effort mainly to MPAs with high use or sensitivity during the first year.

Because of limited staff near the MPA's, DFG will initiate directed patrols to increase visibility and decrease unauthorized user impacts. Directed patrols will be conducted intermittently and can be initiated for a number of reasons.

Year one's enforcement effort should be projected to be moderate due to staffing levels and other mandates. DFG will direct patrol efforts toward these MPAs, with the understanding that redirection of existing enforcement staff from their current duties is not an option. Overtime and directed patrols will augment available MPA enforcement. MPAs close to ports will routinely see more effort than the MPAs that are more remote. DFG will implement increased MPA patrol efforts as new positions are established and filled.

Year Two (2007-2008)

Continue with the hiring process for the nine positions authorized in the 2006/2007 budget.

Continue to patrol MPAs with existing enforcement staff as described in year one.

Late in year two, assuming the recruitment and retention problems are solved, the Department should have the first group of wardens filling the MPA funded positions. These wardens will be assigned coastal positions between Pigeon Point and Point Conception. Four wardens would be assigned between Pigeon Point and Big Sur, and four wardens between Big Sur and Point Conception. The eight wardens would be supervised by one lieutenant located in the Monterey Bay area. These wardens will be MPA emphasis wardens, but will also be involved with other DFG enforcement patrols and priorities.

These wardens will offer an increased level of service and patrol in the MPAs. The patrol efforts in all of the MPAs will see significant increase, especially areas that are more remote where minimal patrol effort was seen in year one. MPAs near ports will receive a significant boost in patrol effort as a result of these new positions. These wardens will work closely with other DFG wardens and utilize other DFG staff as needed and available to assist with MPA enforcement. Directed enforcement patrols and details will continue to be utilized to infiltrate problem areas and work identified issues.

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Additional DFG Enforcement Resources

DFG has three large patrol boats in the 54 to 65 foot class stationed at major ports along the central coast. Each large patrol boat is staffed by one lieutenant and two wardens. DFG also has a fleet of single and twin engine fixed wing aircraft that work in conjunction with both marine and land based wardens to help identify and investigate violations.

Contingencies and Emergency Planning
Placeholder to discuss contingencies for natural disasters and/or unforeseen changes in local conditions.

8.4.3. Operations
Equipment and Facilities
Placeholder to detail equipment and facilities needs beyond existing resources.

Staffing
Placeholder to discuss staffing needs.

Based on staff positions received in the 2006/2007 State budget, the Department intends to hire an management/policy level staff person to oversee implementation of the central coast MPAs and planning in subsequent study regions. Ten of the other new positions have been allocated to assist with planning in the next study region. These staff included a range of expertise and classifications from entry level data collection and analysis to specialist and supervisory level planning staff. The staff are expected form the core of a new Department Marine Region project focused solely on MPA planning issues.

In addition to the above, staff are expected to be added to existing Department Marine Region projects with duties that will include implementation of the central coast MPAs in addition to implementation and ongoing management under the scope of the Marine Life Management Act. Examples of projects that have new staff allocations include: groundfish management; bay and estuary management; invertebrate management; state finfish management and state fishery review; research vessel operations; and fishery independent data collection. All of these staff perform duties which support a range of Department priorities, including MPA monitoring, management and implementation.

Enforcement staffing and implementation concerns are discussed in section 8.4.2 above.

Collaborations and Potential Partnerships
Placeholder to discuss potential partnerships.

8.4.4. Costs and Funding

Estimated costs
Preliminary cost estimates of baseline monitoring are provided in section 8.4.2 above.

Placeholder for monitoring and management budget.

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Potential funding sources

Placeholder to describe funding sources.

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8.4.5. Timelines and Milestones

Timeline and Criteria for Implementation

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The Department may recommend partial implementation of the preferred plan based upon ease of establishing, monitoring and managing the areas and dependent upon the level of funding and staffing included in the 2006/2007 budget. Given those considerations, the following areas could be implemented in order of increasing cost/difficulty:

1. All MPAs from the southern edge of the Pt. Lobos SMR (including the proposed MPA there) to the Monterey Breakwater. These areas have existing infrastructure, on-site enforcement or monitoring staff and existing research and monitoring sites. These areas could be implemented immediately upon adoption of regulations (presently expected in February 2007).
2. Elkhorn Slough, Morro Cojo Lagoon, and Morro Bay. These areas would not require new enforcement vessels and existing public presence and on site facilities can provide for additional support. These areas could be implemented within 6 months of adoption of the master plan (approximately August 2007).
3. Año Nuevo State Marine Reserve, Natural Bridges State Marine Park and Reserve, Big Creek State Marine Reserve and Conservation Area. These areas, though more remote all have on-site staff and existing infrastructure that could be used to help with enforcement and monitoring. These areas could be implemented within 1 year to 18 months of adoption of the master plan (February to August 2008).
4. Other areas are either remote or would require additional enforcement personnel and equipment. These would be implemented 18 to 24 months after adoption of the master plan (August 2008 to February 2009).

Timeline for Evaluation and Review of Effectiveness

Once data on the effects of MPAs have been obtained, they can then be evaluated with respect to data collected in other California and worldwide MPAs to determine if the intended goals have been achieved. The evaluation of these data along with a statement of statistical confidence determines the MPAs effectiveness.

Since most biological responses will lag behind the change in protection, minimum time limits must be established. These minimum limits should allow sufficient time for change to occur and for planned monitoring to detect this change with statistical significance. To meet the ongoing needs of an adaptive management process, however, it is also necessary to establish upper time limits. Upper time limits ensure the MPAs will be reviewed in a reasonable amount of time.

Though some changes may be very rapid, most will take many years to accrue, especially given the biology of fish and invertebrate species in the region. In order to allow the process of adaptive management to continue, however, review cannot be put off indefinitely. Thus, it is recommended that a major review of this monitoring program's results occur approximately

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